

POPULAR MECHANICS

OUTDOOR SPORTS MANUAL

*220 Helpful Hints for the Fisher-
man, Hunter, Camper, Trapper,
Archer and Boatman*

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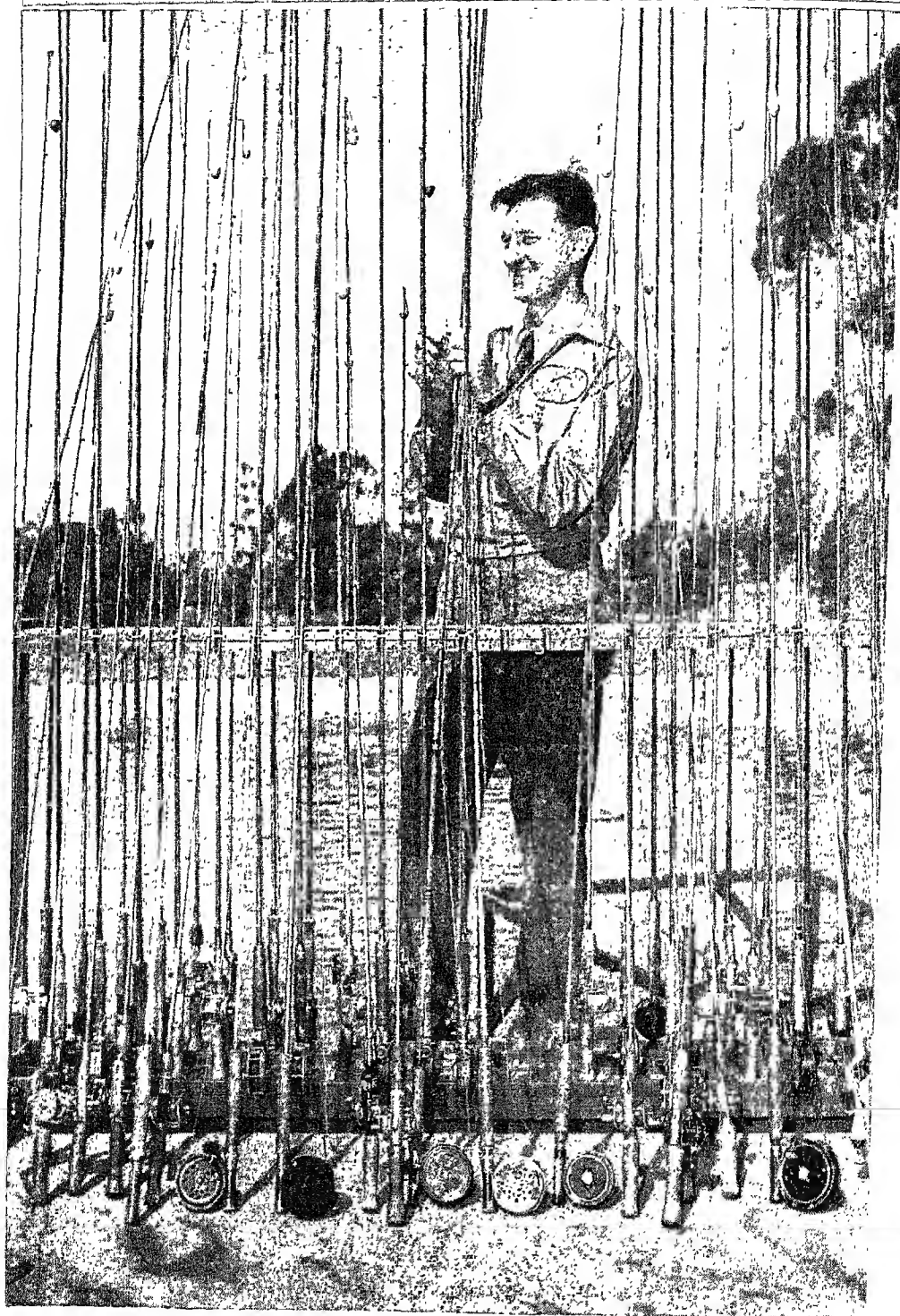
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PART I



for the
F I S H E R M A N

Tips on Tackle




By Claude M. Kreider

Photos by Ray Chapin

"FISHERMAN'S LUCK" depends to a large extent on the fisherman's tackle. The wise angler will always devote special care and attention to this department. Equipment should be chosen for the exact kind of angling you expect to do, for in all sport fishing, whether it be for bass, trout, or pan fish, the greatest enjoyment and best results will be possible only with tackle designed for that use. And proper "balance," or matching of rod, reel and line as a smooth-working unit, is essential.

If you are uncertain on these points consult a fishing friend. Try out his proved and balanced outfit, and be guided by his advice. Trial casting on a lawn will tell you much, and actual practice at a pond, or park pool, is even better. Note the definite relation of the weight of a reel and the size of a line to the action of the rod. Many experienced anglers struggle along for years, handicapped with poorly balanced tackle,

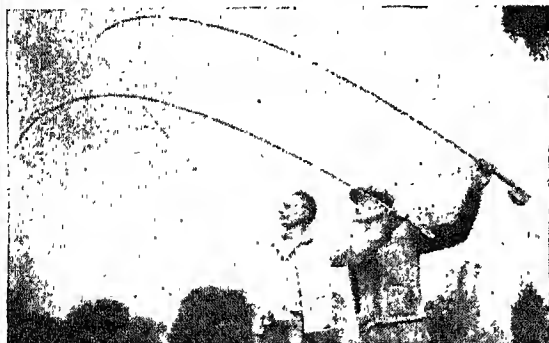


A symphony in carefully matched fishing gear draws a broad grin of appreciation from the caster at left. Above, a gamy large-mouth bass comes to the net after losing the final bout to a husky bug-rod

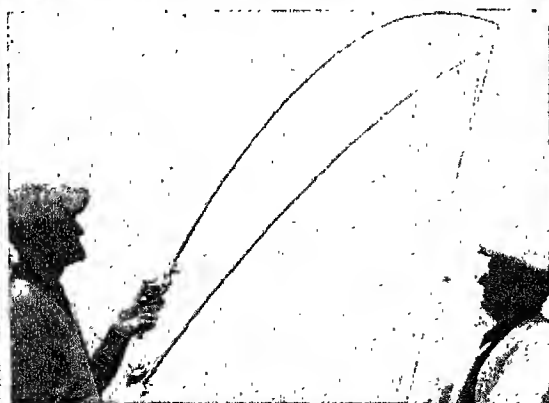
A rod should bend to suit its purpose



Angler tests back cast "pull," which powers long forward cast



↑ Top rod suited for all-around fly fishing, bottom for pon fish.
↓ Flexible rod is for boss casting, stiff rod only for trolling



when perhaps one new line, or a trade for a different reel, would cure their troubles.

Let's consider fly-fishing tackle first. Fly rods come in lengths from 8 to 9½ feet, weighing from about 4 ounces to 6½ ounces. The smaller rod is suitable for pan fish and small-stream trout fishing. It should have a reel weighing not more than 5 ounces, which will just hold the 30 yards of enameled or oiled-silk fly line to "fit" the rod. This means a line heavy enough to bring out the rod's action, but not so heavy as to strain—and soon ruin—the slender bamboo. A size "E" line, which measures by micrometer .040 inch thick, should be about right, but only an actual trial outdoors will tell.

The heavier 9 or 9½-foot rod for bass fly use needs a line of "C" or "B" size, measuring .050 inch or more, to permit easy, effortless casting. And this larger rod requires a reel with a spool about 3½ inches in diameter to hold sufficient line of the heavier size. You should make sure the line is the right kind for the reel before purchasing, remembering that a fly reel is really only a "line holder" and need not be expensive or finely finished. The lighter its weight the better your fly rod will perform.

Fly rods of similar appearance and size often vary in action. Try out those you like by threading the line through the guides and pulling down the tip end of the rod to study its arc. Some will bend rather evenly throughout, a so-called "soft action." This is an all-purpose type of rod and is not easily damaged by legitimate use. It is good for wet-fly and light spinner work and also will do for bait fishing. Other rods will have little bend through the lower part but a decided, sharp arc in the tip section. This denotes "dry fly" action, which is desirable for delicate dry-fly fishing. Also, in modified form, it is a good design for all-around fishing. A rod so built, 9 feet

long, weighing $5\frac{1}{2}$ to $5\frac{3}{4}$ ounces, is the best you can find for all-purpose work. The comparatively light tip permits careful handling of small fish, yet the rod is capable of taking good husky trout or bass in big water.

Before final decision, examine the rod fittings. They are important. A good, screw-locking reel seat of either metal or plastic material is essential. The ferrules should be snug fitting and require considerable pressure to seat. They should be of nickel or German silver, rather than of nickel-plated brass, for strength and long life. Guides should be of the "snake" type of hardened steel. A sufficient number of them, properly spaced for ease of casting, distributes strain throughout the rod, indicating a well-designed tool. Ten guides should be the minimum number on a 9-foot fly rod.

Now we take up bass casting tackle.

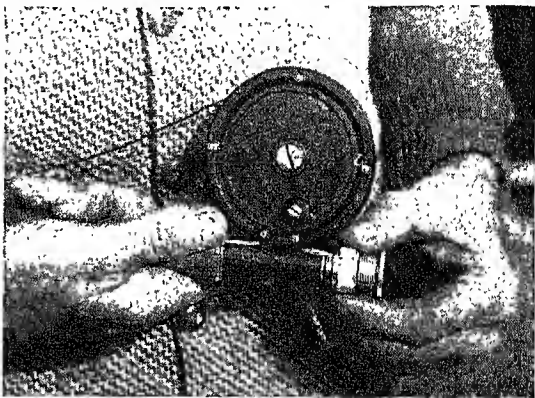
Rods for plug casting, so popular for large and small bass, pike, pickerel and other fish, come in practical lengths from 5 to 6 feet. The shorter ones are stiff and suitable only for trolling. A $5\frac{1}{2}$ or 6-foot rod with considerable "whip" to cast a lure effectively is the best choice. It too may be used for spinner trolling. Try the rod for arc, as suggested for fly rods. Then hang a standard $\frac{5}{8}$ -ounce bass plug from the tip and whip the stick to get the feel, remembering that smooth, flexible action, especially toward the tip, will permit accurate casting with little more than a flip of the wrist. Again, an outdoor casting test at a target—an old bicycle tire laid on the lawn is ideal—will give you a real analysis of your rod and reel.

The reel is your most important tool for this work if you would send that lure out 100 feet, straight and smooth, without troublesome backlashes, the bane of every bass angler. It should be precision built throughout with jewel or phosphor-bronze bearings

Check guides, screw reel seat and ferrules



The number of guides determines strain on rod and wear on line



↑ Screw reel seat with duralumin fittings holds reel securely

↓ Ferrules should fit snugly with sufficient length for long wear





Rod, reel and line should work as a team. Left, 9½-foot bass-bug rod has heavy line. Smaller rod at right is all-purpose

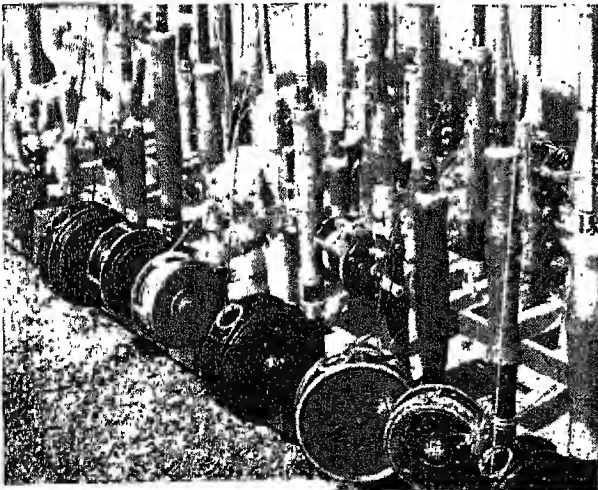
and a well-designed level-wind device to spool in the line accurately as you retrieve your lure. Choose a light, compact reel, for it will hold all the casting line of 12 or 15-pound test you will need. It should fit snugly in the locking device of the rod and be close to the cork grip to permit easy and natural "thumbing," the one delicate and all-important action in bass lure casting. Your practice sessions soon will demon-

strate that an "educated thumb" is the one great essential. Bass casting line needn't be so carefully fitted to rod action as the fly line but avoid the usual mistake of buying one too heavy. A 20 or 25-pound test line will cast poorly because of its actual weight and the increased friction as it leaves the reel and goes through the guides. One of 15-pound size—even 10-pound is entirely practical—is amply strong for any fish your rod could handle. Once more, this comparison of lines can be demonstrated best by actual trial. Either braided silk or nylon in soft finish is the best casting line and most of these now are cravenette finished in order to render them waterproof.

In choosing your fishing tackle, never forget that equipment worth having is carefully made, that it is a sound investment that will last for years, and that it justifies the payment of a good price. A split-bamboo rod, for example, is the product of numerous hours of fine craftsmanship. A good reel is built with watchlike precision and, if kept clean and well oiled, will last a lifetime. Yet, in a well-made standard grade, it need cost you only the price of a golf club. So shun the shiny but too-cheap one. And don't forget that one faulty, poorly made piece of fishing equipment may let you down, deep in the forest or mountains, and quite possibly spoil a long-planned trip.

Finally, with that cherished new outfit assembled, continue to practice with it beyond the initial "balancing up" stage. Take the old bicycle tire or a tin plate out on the lawn and learn through practice the art of scientific casting. There is no secret to it—practice pays big dividends when you seek the canny trout or bass. If there is a fly and bait casting club in your vicinity, visit it and talk to the experts there. They will be glad to offer advice and teach you the proper casting technique. Remember, "it is not all of fishing to catch fish."

Bait-casting reels are fitted with cork handgrip to provide easy and natural "thumbing" of the spool when lure is shot out



RODS, REELS and LURES

Just knowing where they are isn't enough — knowing the right lure, the proper rod and reel, and how to handle these bait-casting "tools" — that's the combination it takes to catch 'em

By Robert Page Lincoln

TIME was when bait casting was done with a "multiplying" reel and a short steel rod measuring only 3 or 4 ft. in length. But the refinements of experience in plug throwing soon brought a demand for a longer, more pliant rod plus that certain nameless quality in a rod which a fisherman calls "life." Nowadays, and only after ideas got a lot of kicking around, the seamless tubular steel rod about 5½ ft. in length gets the okay from most bait casters, although somewhat longer rods are used by some with good success. Others still use the shorter rod for such specialized work as salt-water fishing from piers, bridges, or causeways where the short rod is more or less a necessity. Good steel rods of a tapering square or triangular section also are finding considerable favor, especially when handling the heavy spoon lures or the large plugs. These rods, being stiffer, generally have somewhat more initial "drive," an aid in getting a heavy lure away on a long cast. Bamboo bait rods also are preferred by many fishermen for throwing live baits, heavy lures and for other special purposes. They like the stamina and "backbone" of the bamboo rod. An offset handle on a bait-casting rod, Fig. 1, has some advantages over the straight handle. In the former the reel position puts the thumb in a natural, unstrained contact with the



TYPES of LURES



reel spool and gives a more delicate and positive control of the running line. Bait-casting reels of the 100-yd. line capacity are perhaps the standard. Actual capacity is usually between 80 and 100 yds. Line sizes used in bait casting range up to 24-lb. test. Hard-braided lines are quite generally favored.

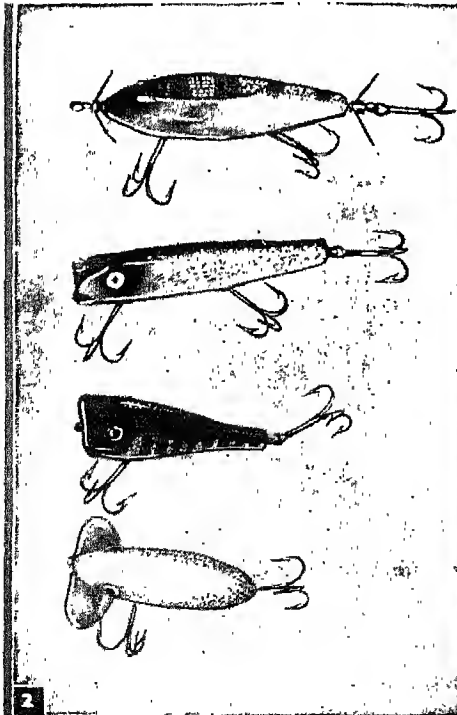
A bait-casting reel, Fig. 1, should have the level-winding feature, which aids in laying the line on the spool. Some reels have large-diameter cork arbors which prevent slippage and bring the line up high on the reel spool. On other reel spools with small arbors many fishermen fill the spool partly with old line, then attach sufficient new line to fill the spool to within $\frac{1}{4}$ in. or so of the spacer bars. A full reel gives better control of the line at the start of the cast and aids in thumbing the line when casting and also in playing the fish.

Lures for bait casting, Figs. 2 to 6 inclusive, come in various types: the floating or

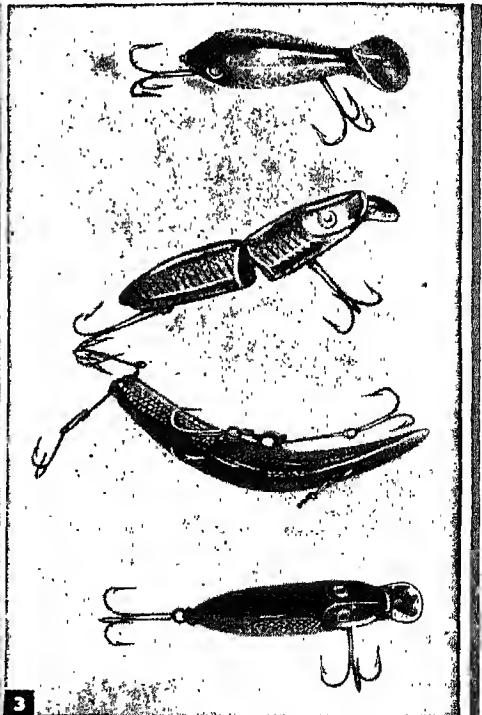
top-water lure, the combined top-water and underwater or diving lure, the sinking-plug lure, and the various metal lures, also of the sinking type. Then there are the baby or lightweight plugs, most of which work 6 to 12 in. under the surface. Floating plugs are usually jerked or "popped" on the surface to simulate live bait. Effective standbys, these, and they can be used successfully in most waters where the black bass is found. Some lures in this class are so designed that they give the necessary animation when merely reeled in steadily. In the second class named are the lures which float when at rest, but when reeled dive underwater and have a snaky, undulating "crawl" that is very effective. The typical red-head wobbler, with a scoop indentation at the head, is a popular number. Most of these lures have specially shaped metal mouthpieces that cause them to wriggle through the water.

The third class, called sinking lures, will sink slowly if not reeled in promptly. Many have propellerlike spinners fore and aft which give them animation. Others, such as the deep runner, can be trolled deep. The latter, and also some other types, can be used for under-surface trolling in the summer when the bass lie deep.

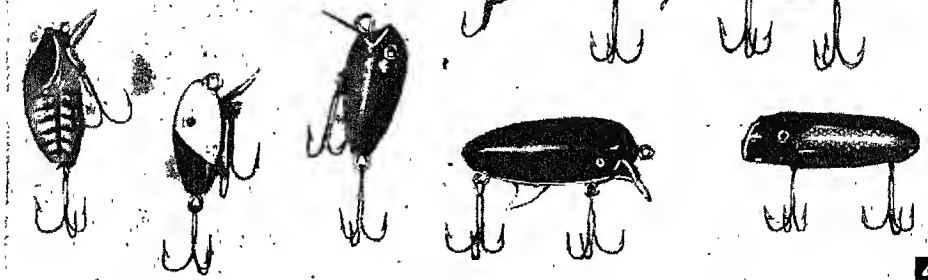
FLOATING LURES



DIVING LURES



Lightweight or Baby Lures

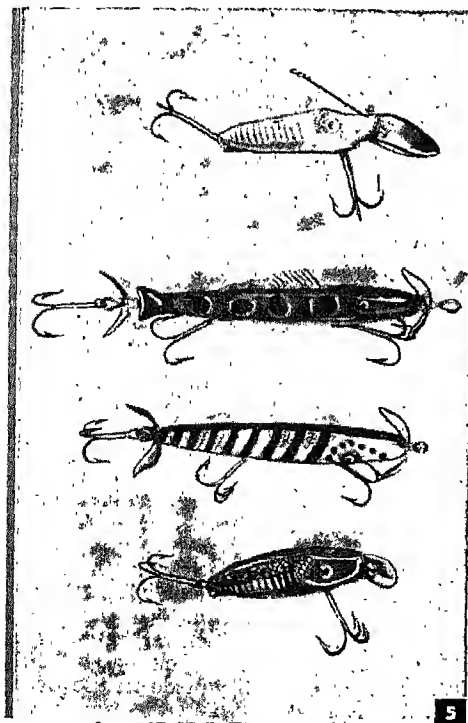


Metal, or weedless, lures should be included in the tackle box for often they will take fish when the plug lures fail to make connections. The skirted weedless lures may be cast into the lily pads or other vegetation and then reeled in without snagging. The same is generally true of pork-rind lures which come in both plastic and metal construction. Bass lures range from $\frac{1}{2}$ to 1 oz. in weight with the in-between $\frac{3}{4}$ -oz. weight about the most popular. Lures lighter than $\frac{1}{2}$ oz. belong in the baby bass-plug class.

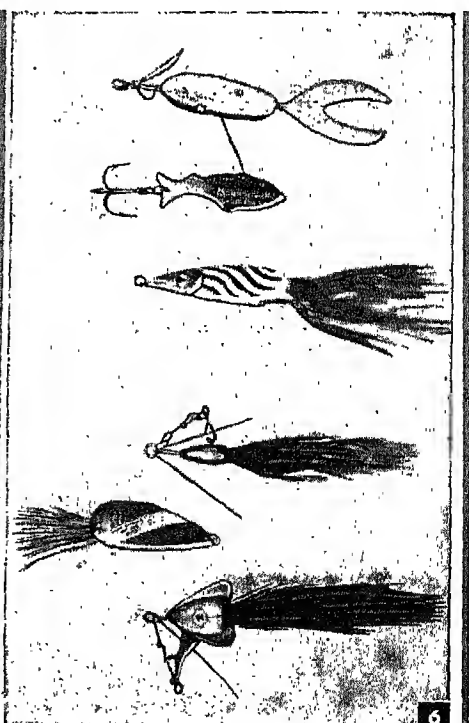
Often these baby plugs are miniature duplicates of larger lures. Others are original in design but most of them belong to the wiggler type of lure. Of course, nearly all plugs are considered most effective when used in fairly clear water. The lightweight items are particularly useful when fishing near banks and around logs. Use 9 to 12-lb. test lines when throwing the light plugs.

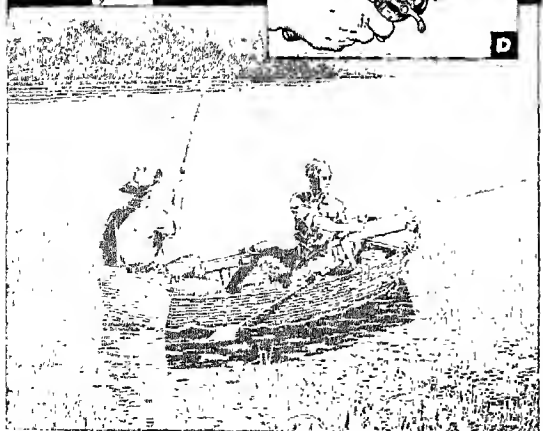
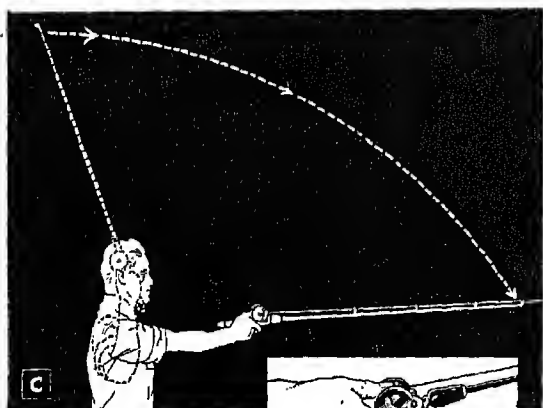
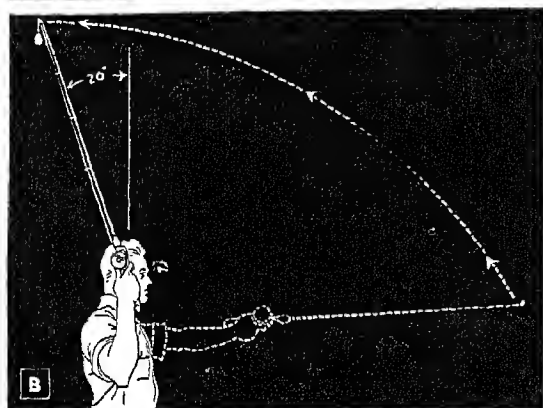
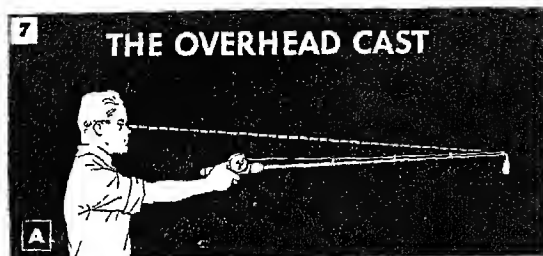
There are two generally accepted methods of bait casting, the overhead cast and

SINKING LURES



WEEDLESS LURES



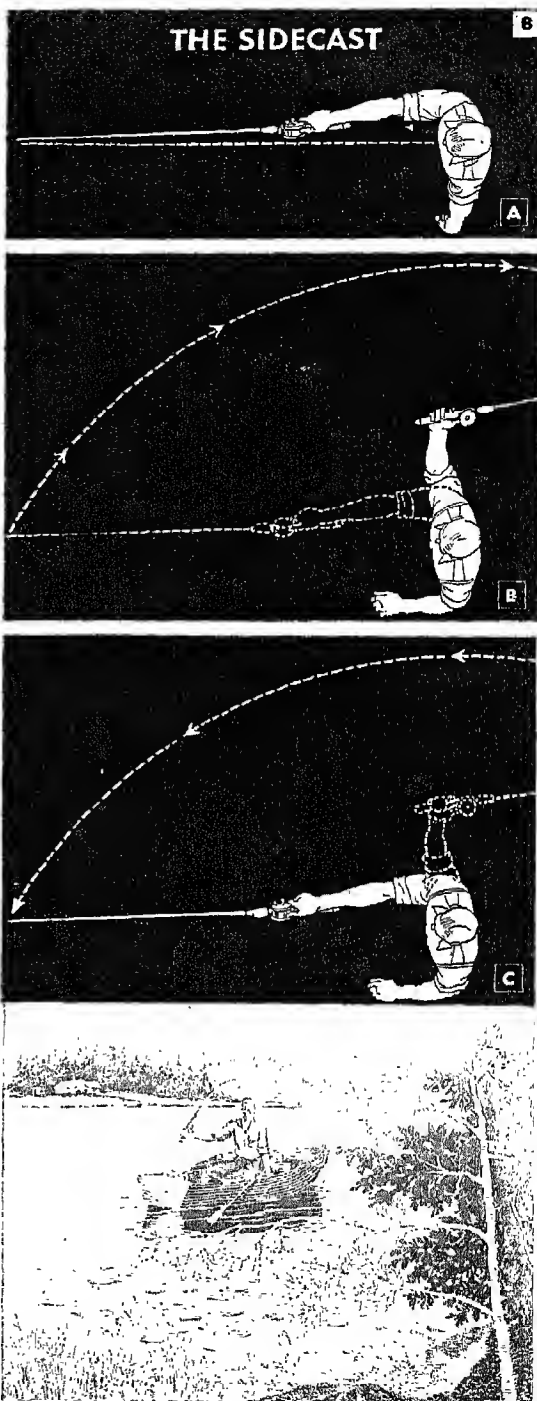


the side cast, the latter also known as the underhand cast. Overhead casting is the usual method used over open water but some good fishermen favor the side cast for all conditions, and all use the side cast where it is necessary to work close to shore or under overhanging trees. The mechanics of the overhead cast are quite simple. The trick in making this cast is holding the rod tip toward the spot where you wish to place your lure, Fig. 7, A. The rod is then carried straight up over the right shoulder, Fig. 7, B, so that it assumes a backward slant of about 20 deg. There is only a slight pause between the back cast and the start of the forward cast. It's a combined wrist and arm motion. As the lure goes forward some casters stop the rod at approximately a 45-deg. angle. Others drop the rod almost to the horizontal position, Fig. 7, C. One trick in preventing backlash is simply tipping or turning the rod one quarter turn to the left as the lure goes forward. This movement also helps to slow the reel spool.

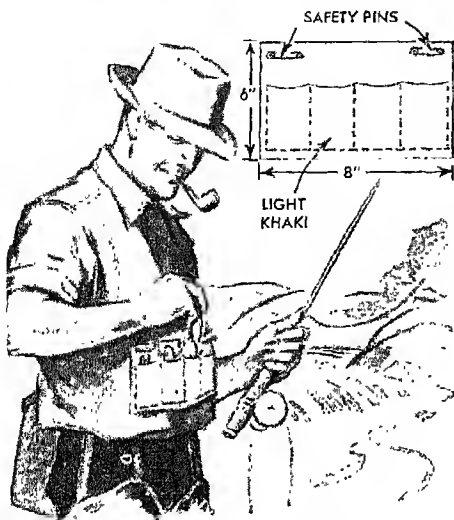
Skillful thumbing of the line, Fig. 7, D, is a trick one must master by practice. The main purpose, of course, is to prevent the line going slack behind the plug. Thumbing starts when carrying the rod over the shoulder preparatory to the forward cast. The thumb is then pressed firmly on the reel spool. But as the forward cast is made the tip of the thumb is lifted slightly so that the line can feed out. The idea is to feed just enough slack into the line so that it "keeps up with the plug," so to speak, without retarding forward movement of the lure. Then, as the cast nears its end, you can drop the lure where you want it by light thumb pressure. The underhand or side cast, Fig. 8, A, B and C, is simply the overhead cast made with the rod swinging in a horizontal plane. Here the rod is carried back to the same 20-deg. angle as in the overhead cast and the forearm is brought into play as before. A snappy wrist action is imperative. It takes practice to master the side cast, more especially because you can't "aim" the plug as you do in the overhead cast. When the rod move-

ment is finished the tip points at the spot toward which you're aiming the lure. The movement of the rod throughout is altogether in the horizontal plane, not up or down. The reel remains more or less horizontal throughout the cast, the spool of the reel facing up. Leaning the body to the right and bringing the head down in line with the horizontal position of the rod, aids some casters in making accurate casts by this method. Many casters use the side cast exclusively when fishing from a boat. And when you have to get under trees and overhanging branches the side cast must be used from any position. Some casters find it easier to let the wrist take a natural twist in the backward and forward movements, Fig. 8, A, B and C. This twisting motion tends to give more freedom of movement and a snappier wrist action. At the start, A in Fig. 8, the reel is in the vertical position. From the start to the finish of the back cast, B in Fig. 8, the rod and reel are turned about 90 deg. Then, as the rod is brought forward, Fig. 8, C, the reel and rod come back to the vertical position again. Of course, the equipment must be in good condition. Worn guides, a loose, shaky reel spool or a frayed line—any one of these defects will cut down accuracy and shorten the distance of the cast. Rough, badly worn guides are especially troublesome. They slow down a running line and may snag it and break the coating. It's difficult to keep a worn reel lubricated so that it runs free. Most reels can be made as good as new by replacing worn parts.

A bait-casting leader of synthetic gut or raw silk is generally best as it forms a more or less invisible connection between the line and lure. Also, the leader gives a better action to the reeled lure. Gut leaders for bait casting are usually fitted with snaps, thus making a change from one lure to another only a matter of seconds. Medium-sized snaps are used for average-sized lures. The fly-leader type snaps generally are best for light lures. Even though no gut leader is used, snaps should be used. They are tied directly to the line.

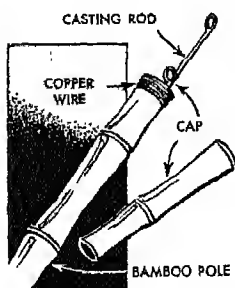


Bait Carrier Fastened to Shirt Keeps Tackle at Hand



When wading in midstream or fishing along the shore, it's difficult to carry a tackle box with a supply of extra baits. However, with this canvas carrier, three or four lures can be carried with no inconvenience. The carrier is made of light khaki cloth and each pocket is about 2 by 4 in., the number of pockets being determined by the number of lures you wish to carry.

Bamboo Case for Casting Rods



There won't be any danger of your favorite casting rod being damaged when transporting it in a car with other luggage if you keep it in a carrying case made from a piece of large-diameter bamboo. Two pieces are required, one of a diameter large enough to take the butt end of the rod, and another of a size to take the small end of the rod and slip into the end of the large piece. The connecting webs inside the bamboo can be punched or burned out with a red-hot rod. The open ends of the case can be fitted with ferrules cut from thin-walled tubing, or you can wrap them with fine copper wire and flow solder over it. The solder should be smoothed down to make a snug-fitting joint when the case is assembled.

Fishing Flies Are Tied Quickly With Drill Clamped in Vise

To speed the time required to wind the bodies on fishing flies, one sportsman uses a breast drill clamped in a vise. The hook is held in the chuck of the drill and the shank and eye are left free. The shank of the hook should be centered so that it does

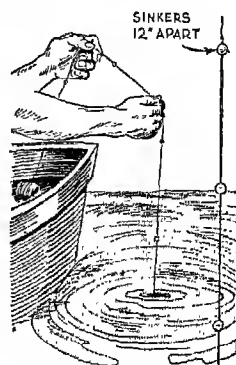


not wobble. After the body has been wound in the manner shown, the drill is dropped down in the vise so the crown gear cannot rotate. Then the other parts of the fly can be tied on the hook while it is still being held in a convenient position.

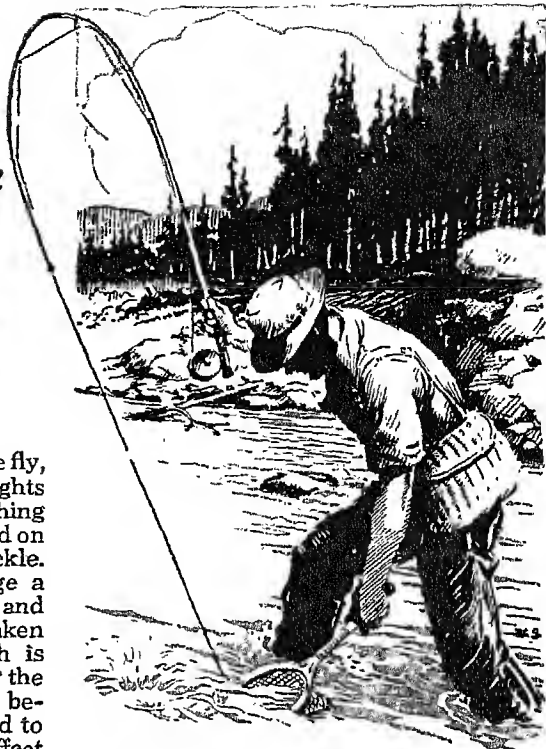
H. Leslie Thompson, Sarnia, Ont., Can.

Line to Measure Depth of Lake Made From Cord and Sinkers

By attaching split-shot sinkers to a cord and spacing them every 12 in., one sportsman had a good line for measuring the depth of the water wherever he was fishing. If you have a set of metal stamps, each sinker can be marked to show the depth at a glance.



How To Recondition Bamboo Rods

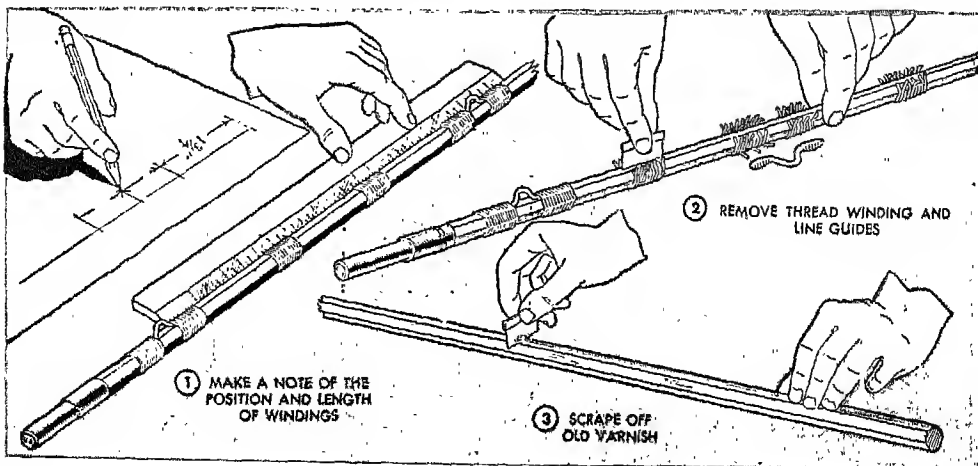


WHEN fighting trout or bass take the fly, or when the deep-sea heavyweights hit the lure, from there on out everything depends on your skill as a fisherman and on the strength and reliability of your tackle.

After several seasons of hard usage a bamboo rod may appear rather shabby and unkempt. Perhaps the tip section has taken a "set" or bend; likely the varnish is chipped or cracked badly, and probably the guides are worn and the windings are beginning to fray at the edges. If allowed to go without repair these defects will affect the efficiency of the rod.

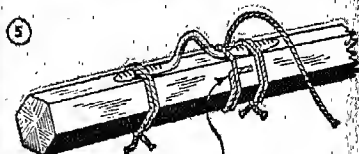
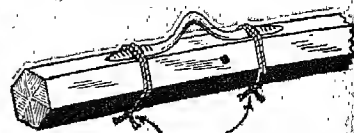
The first thing to do in refinishing a rod is to make detailed notes of the position of the windings and guides as in Fig. 1. Note also the width and color of the windings. Then cut through the thread with a sharp razor blade as in Fig. 2. Usually the old varnish can be removed quite easily by scraping with either a razor blade or a sharp knife as in Fig. 3 but be careful not to round the corners of the hexagon section or to cut any deeper than the varnish coating. Don't use a varnish remover; however, nail-polish remover can be used

very sparingly to clean off what remains of the varnish, after a thorough, careful scraping. If the ferrules are loose, remove them as in Fig. 6. Then scrape off the old cement, melt new cement, which comes in stick form, and apply in an even coating. Force the ferrule back in place, Fig. 9, and give it a quarter turn to spread the adhesive uniformly. Wipe off all surplus which may be forced out. Sometimes on old rods the bamboo segments will be separated at places along the length, especially near the ferrules. Treat this condition as in Figs. 7 and 8, and be sure to allow plenty of time





Making the

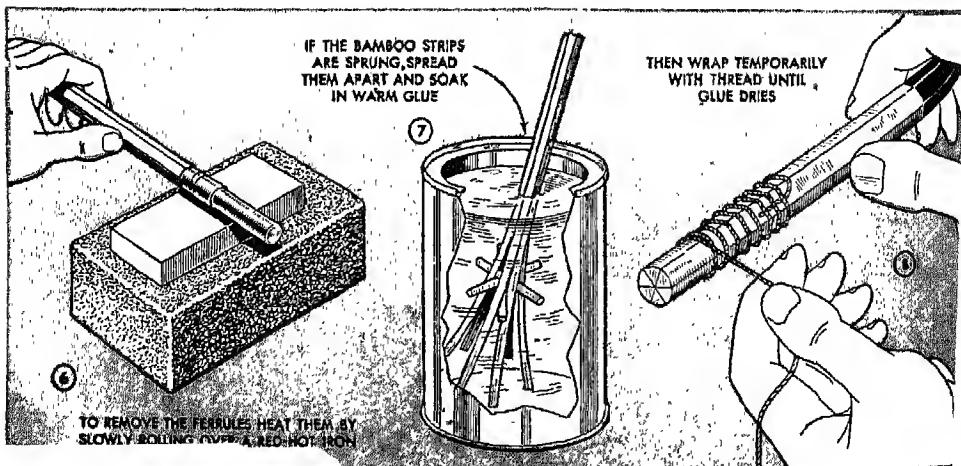


for the glue to dry before unwinding the "clamping" thread. Wipe off surplus glue with a damp cloth before it dries. In this operation, it's important that the segments fit true, otherwise that section of the rod may show up a bend or "kink" which will affect its usefulness.

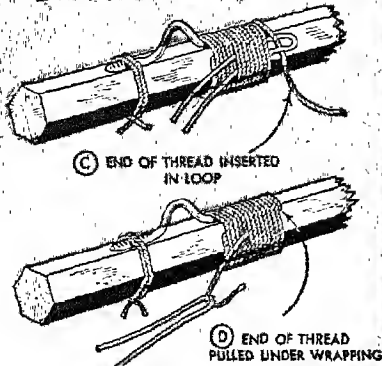
Now's the time to make sure that the ferrules fit properly. Often old ferrules tend to stick due to accumulated dirt and corrosion of the sliding surfaces. A buffing wheel will polish the parts to a velvety fit, but you have to be careful that the metal is not heated to the point where the cement will be softened. Badly roughened or corroded ferrules will have to be smoothed with very fine emery or "crocus" cloth, Fig. 11, before buffing. It's necessary to be careful that you don't polish away the metal to the point where the parts fit loosely. With the work completed to this stage, check the location of the guides from the reference sketch previously made as in Fig. 1, and mark lightly on the rod the position of each. If there is a set or bend in either or both of the rod tips—most fly rods are provided with two

tips—the bend can be worked out by gently straightening the tip against the original set, using both hands. This takes a bit of patience, but the method is effective. Another way is to hang the tip from the ceiling with a weight attached to the lower end. Guides should be replaced on the underside of the bend. Many rods are fitted with the so-called "snake" guides, and any of these that show undue wear or other damage should be replaced with new parts. This also is particularly true of the reel guide and the tip-top guide. If these are worn or grooved they will damage the line.

Fig. 5, details A to D inclusive, shows how to tie an invisible knot when making the new windings. First give the rod a thinned coat of special rod varnish and allow this to dry thoroughly. You'll note in Fig. 4 an arrangement for maintaining a uniform tension on the thread when making the windings, the thread being pulled through a music clip attached to a standard. Jaws of the clip should be smoothed so that they do not tear the strands of the silk thread. Use the same color and size of thread as the



Invisible Knot

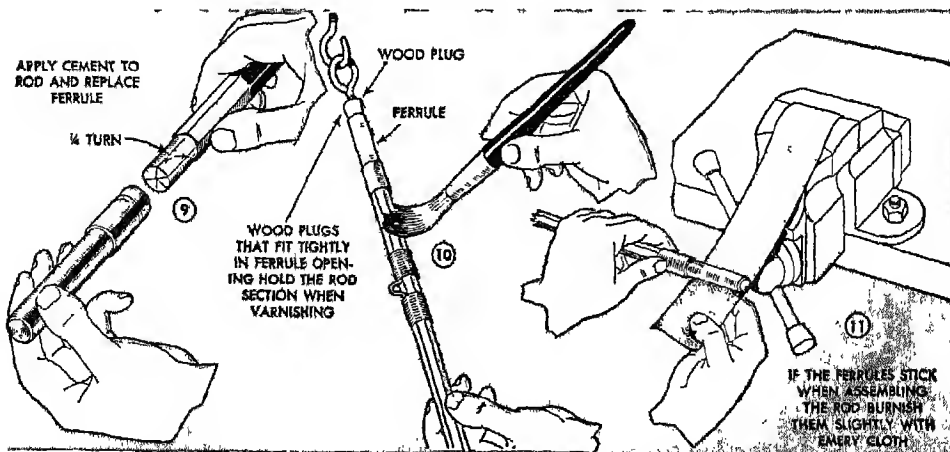


original windings. It should be remembered that the windings add "tension" to the rod and that's why it's important to duplicate the position of the originals. Although the number of turns may vary, 25 turns per winding is a good average. Some refinishers space in an extra winding to stiffen an old rod, but usually this is not necessary.

Apply thinned white shellac to the windings and when dry follow with several coats of clear collodion or a special silk-thread color preservative. Use your finger for these applications as a brush picks up too much of the finishing material. Follow with three to five coats of rod varnish applied with a small brush as in Fig. 10. Hang the sections of the rod by fitting a wood plug and screw eye in the ferrules. Allow the varnish to dry several days between coats. Rub down the last coat with fine pumice stone and water and finish with dry rottenstone rubbed with chamois. If you wish to



produce an exceptionally fine finish rub down each coat after a thorough drying, using pumice stone only. This leaves the surface slightly rough so that succeeding coats will bond properly. However, the principal purpose of rubbing down each coat is to level the varnish to a film of uniform thickness. After each rubbing clean the rod thoroughly with a damp rag and allow to dry before applying fresh varnish. When not in use the rod should be kept in a case to protect it from breakage, scratches or other damage. A tubular metal case is generally preferable to a cloth one.



By Richard W. Emery

LET the hard-bitten fisherman turn up his nose, if he must, at fishless fishing. Let him scoff at the anglers who seemingly fritter away countless hours casting into waters containing nary a minnow.

The fact remains that fishless fishing is fun!

There's a name for it and even a national society for it. From Maine to California, its advocates meet beside their pools. Some are the sharpest anglers who ever schemed against a fish.

There are reasons why fly and bait casting—without the fish—gathers more followers yearly. Those who cast hookless trout flies and plugs into unpiscatorial park ponds claim all these virtues and more for their sport.

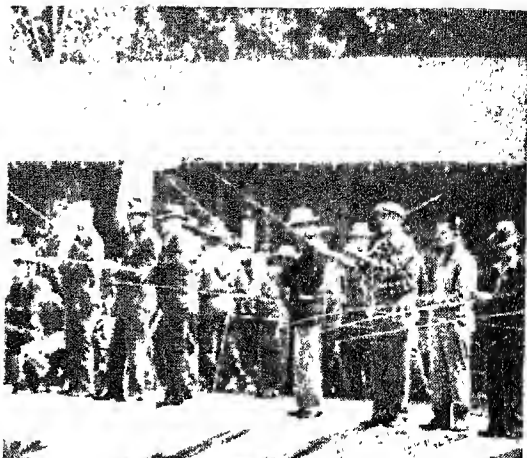
It's outdoors, active and healthful.

It teaches a fisherman to be a better fisherman.

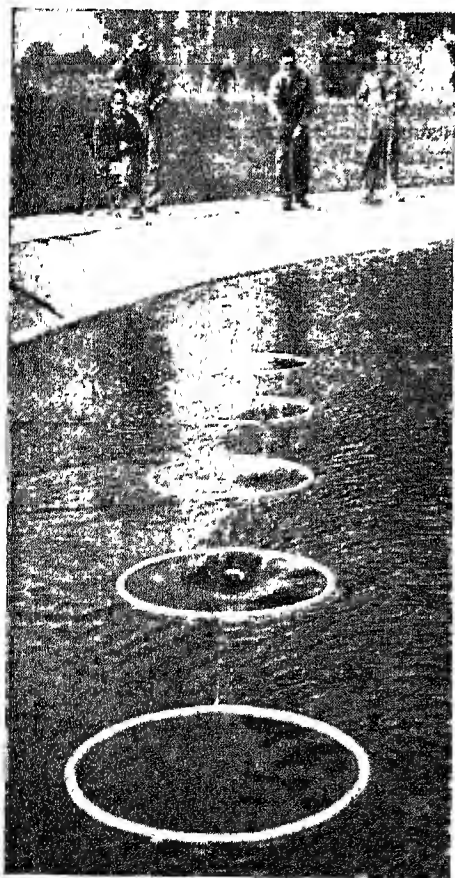
It brings anglers and tackle hobbyists together.

It appeals to the kinetic senses—those of

(Continued to page 20)



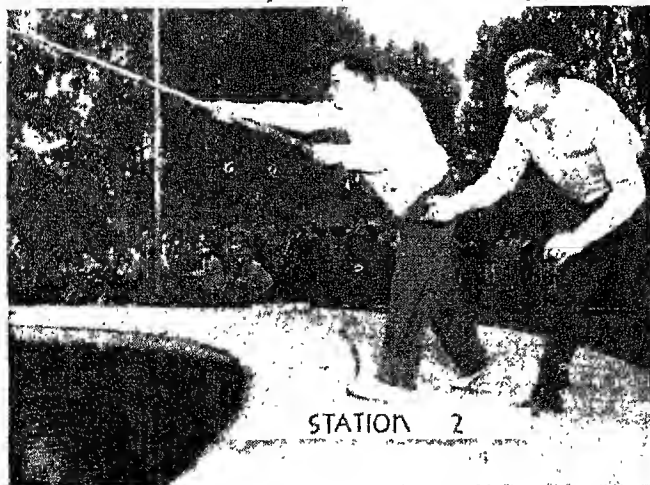
Wet-fly casting, left, is accuracy test. Rings are five feet apart. Ardent caster below is Claude Kreider, trout authority

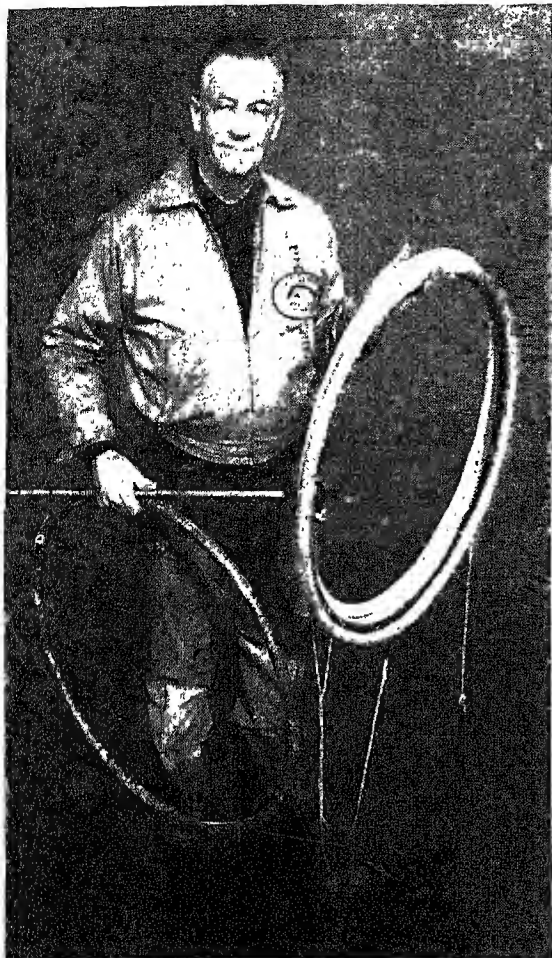




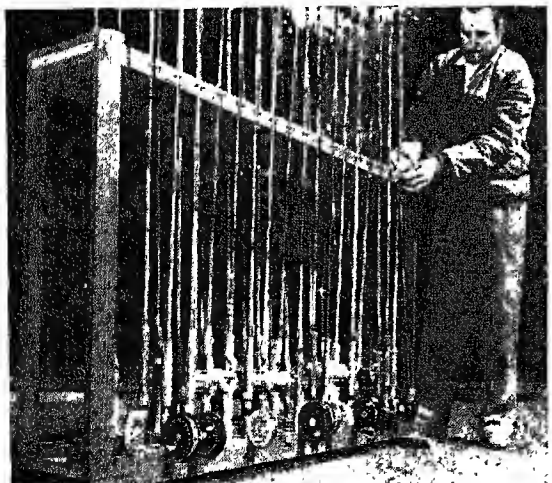
Women, too, join in fun at Casting Club in Long Beach, Calif. Casting a salmon fly, below left, is R. G. Miller, holder of 175-foot-class record. Right, measuring a cast

All photos by Ray Chapin





These are standard casting targets, floating rings 30 inches in diameter, and three-foot measuring stick. Each foot missed knocks a point off 100 starting score. Below, handy tackle rack



muscular coordination, weight and balance—just as does fishing for the genuine article.

Fishless fishing got started 'way back in 1864. Bewhiskered anglers of the New York State Sportsman's Association posted prizes for fly casters. The boys tried it and howled for more. Now casting has annual tournaments, a flourishing national association 42 years old, nearly 100 affiliated local clubs, thousands of men and women members—and millions of dollars worth of pools, clubhouses and tackle.

Typical of the thriving local groups is the Long Beach, Calif., Casting Club, which made an humble start in 1925 and by 1932 was America's host to Olympic Games contestants. The club has a large pool and clubhouse in the city's biggest park. Here is the group's advice on how to promote a casting club in your home town:

Find out which of your city fathers are fishermen and ask them to help you get park space for a casting pool. Perhaps you can find a pool ready-made. You'll need a clubhouse for meetings, fly tying, talks and movies about fishing. The Long Beach members rebuilt a temporary fire station. Each stone in its unique fireplace came from a different trout stream.

Your casting pool should be shallow and clean-bottomed, so that contest judges can wade in it to measure your casts. It must have a level bank or platform near the edge and not more than 18 inches higher than the water. If



you can't promote a pool, a smooth lawn will do.

Standard casting events are for accuracy and distance bait casting, wet-fly and dry-fly accuracy, distance-fly, salmon-fly and various team competitions.

Each type of casting calls for its own tackle. Casters start with one outfit and soon own three or four or a dozen. In fly casting, the fly is like thistledown and the line must be thick and heavy enough to be thrown. Fly-casting reels are for storing the line, not for spinning it out. The line is stripped out by hand.

In plug casting the plug's weight is enough to throw, so the line is threadlike. The plug-casting reel, high geared and smooth running, spins the line directly into the line guides as the plug sails through the air.

Standard targets for casting are round tubular-metal floats painted bright colors. Old bicycle tires make a fair substitute. The targets may be anchored with short strings and eight-ounce sinkers.

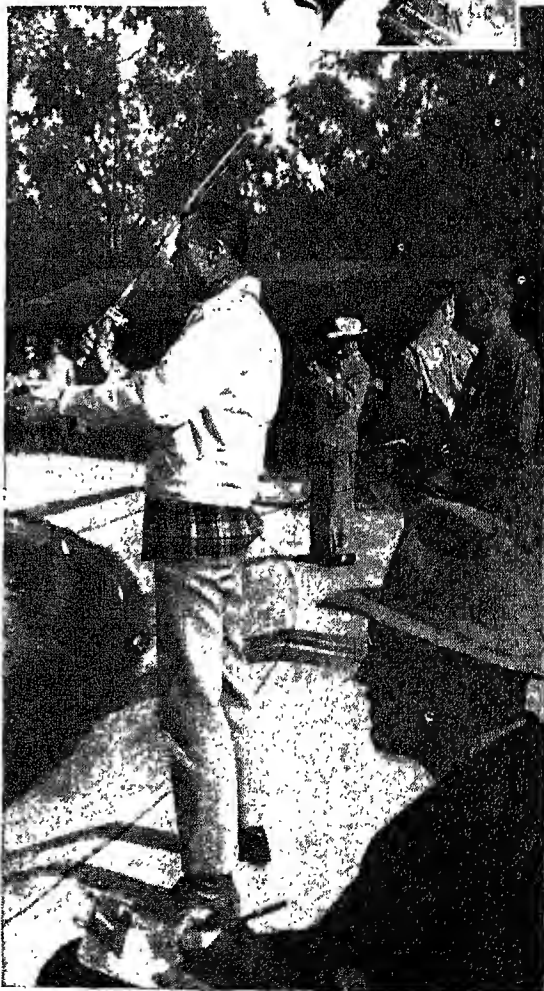
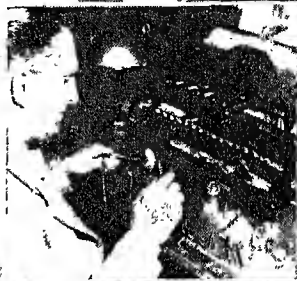
Facing one of those 30-inch rings at a distance of 50 feet, a seasoned fly caster can whisk a hookless trout fly into dead center and a plug caster can drop a $\frac{3}{8}$ or $\frac{5}{8}$ -ounce "bait" squarely into the ring from 75 feet away.

The novice smiles, steps up confidently, whips the air with the rod and spends the next 15 minutes unsnarling line. Casting looks easy—until you try it.

Judges wade easily in shallow pool below



Casters take a lesson in tying trout flies. Bobbin in right hand, thread is wound round fly in vise, at right. Below, casting a plug



"Bring 'Em Back Alive" In This Fish Tank



If you want to keep your fish alive until ready to start home, use a fish tank like this one. It collapses for easy storage and floats on the water when tied to the boat or pier. The tank consists of a round canvas top and bottom, in the hems of which are inserted screen-door springs to keep the tank shaped. The side walls are of fine-mesh fish netting. A slit at the top fitted with a slide fastener provides an opening for inserting or removing fish. An inflated bicycle inner tube cut down to size and attached to the tank at the top provides the necessary buoyancy to float the tank. When collapsed, the tank can be folded easily and carried in the pocket.

Kinks in Hoop of Minnow Net Protect Mesh From Rocks

Damage to your minnow net caused by continually scraping it on rocks in shallow streams can be avoided by placing the hoop in a vise and bending sharp kinks in it. The net loops will then slip into these notches when pulled in the water and thus be protected from sharp edges of rocks.

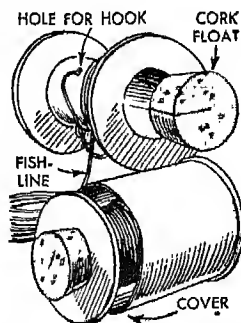


Make This Practical Bait Box

You can well be proud of this bait box, which not only keeps fishing tackle in neat arrangement, but also is a very interesting woodworking project. The original box was made of $\frac{1}{2}$ -in. walnut, but any available hardwood will do. A careful study of the drawings will show you how the box is assembled. The upper and lower halves are identical in size and shape, the top of the box being rabbeted into the upper half and the bottom dadoed into the lower half. Notice in one of the lower left-hand details how the abutting edges, when the box is closed, are rabbeted on opposite edges to form an interlocking joint that excludes water and dirt. The box is put together with simple glued miter corners. When the glue has dried, the corners are slotted horizontally and reinforcing splines are glued in place, after which all corners and top edges are carefully rounded. Two five-compartment trays of $\frac{1}{4}$ -in. stock are made as shown and pivoted to the box with cantilever arms of hard maple. The attaching or pivoting pins are simply pieces of $\frac{5}{16}$ -in. dowel having narrow shoulders or heads turned on the ends as shown in one of the lower details. The pins are inserted through the levers and then glued into holes in the trays, the heads on the pins keeping the levers from slipping off. Hinges and snap locks taken from an old suitcase may be used on the box. A handle is jigsawed from matching wood and is attached by means of wire "hinges" as shown in the lower left-hand detail. After a careful and thorough sanding, the box is given a weatherproof finish by applying three coats of spar varnish inside and outside allowing each coat to dry thoroughly.

Handy Container for Fishlines

An empty adhesive-tape container makes an ideal case in which to carry fishlines and hooks. All that is necessary is to punch 2 or 3 small holes in the spindle of the spool to receive the hooks, the lines being wrapped around the spindle. If desired, a cork float can be inserted in the end of the case. In this way, lines and hooks can be carried safely in the pocket where they are protected against moisture and also prevented from becoming entangled or catching in your clothing.







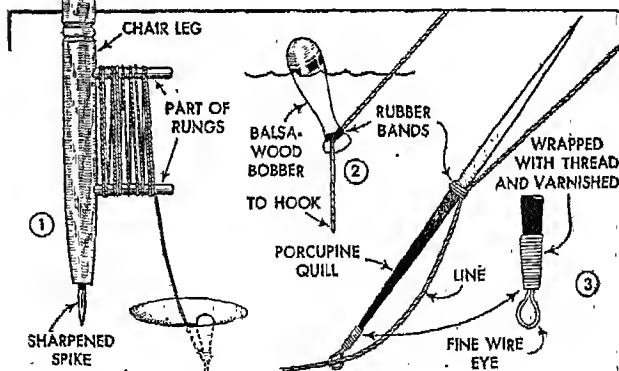
Catching 'em

from one state to another that no specific rules can be given as to what is permitted in the way of winter fishing.

After you have selected your spot and made provisions for comfort, your first job is to break a hole through the ice. Some fishermen use an ax for this purpose, some use a chisel or crowbar, while others prefer a boring tool. If the ice is only a few inches thick, an ax will do, but for chipping through a thick layer you may need a tool that will cut a clean hole. The chipping tool, Fig. 5, which can be manipulated more accurately than an ax, is made by welding an old wood chisel to a length of iron pipe jointed so that it can be taken apart and carried with your other equipment. The auger-type digger, Fig. 6, may be preferred because its sharpened, dished blade scrapes a hole through the ice. For the handle of this tool you can use an old bit

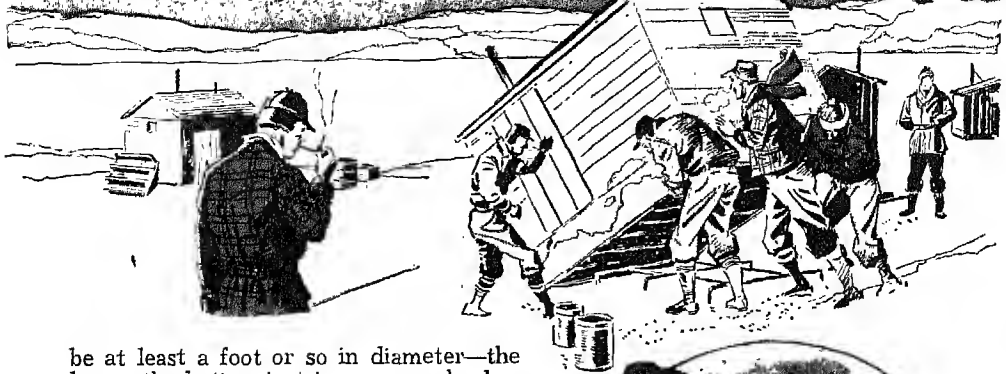
WINTER is as good a time for fishing as any other. Some fishermen say it's better, for the flesh of fish is firmer then—even the common carp and other "rough" fish such as sucker, red horse, buffalo fish and sheepshead, acquire a tasty tang that makes for good eating. Yellow perch, too, can be pulled through the ice, along with northern pike and pickerel, which are as active in cold water as in lakes warmed by the summer sun. Even wall-eyes, which are inclined to hibernate in deep water during the winter, may be coaxed to your hand by a tempting bit of bait dangled through a hole in the ice, and schools of crappies, black and white, flock as hungrily to the "shiners" on your hook.

Before loading your tackle box for ice fishing, however, it is wise to check your local game laws to see what provision is made for this sport. Some states allow you to build huts on the ice so you can keep warm while fishing, but others forbid their construction. Regulations vary so widely



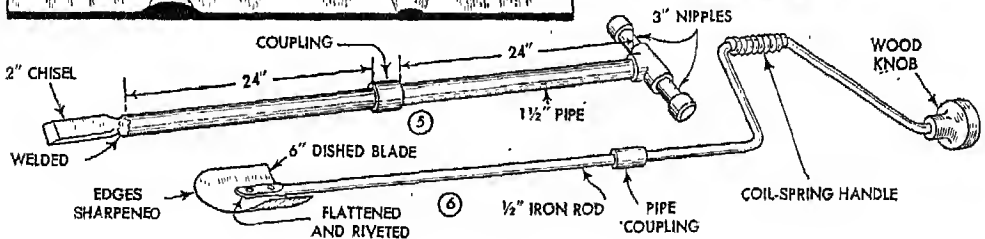
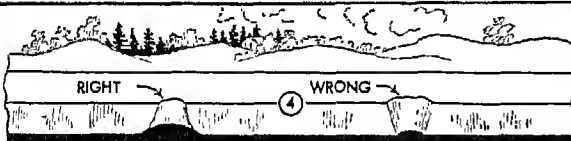
brace, sawing through the shank just above the ratchet and welding a pipe coupling to the shank. Or, bend a length of iron rod to the shape shown, winding a coil spring around the handle for a turning grip. The blade should be made of fairly heavy sheet iron. No matter which type of tool you use, the main idea is to make a hole wider at the bottom than at the top, as in Fig. 4, so that when you feel a tug on the line you can pull in even a large fish quickly, as toward the open end of a funnel. Also, if the hole is narrow at the bottom, its rough edge may fray the line. The hole should

Through the Ice



be at least a foot or so in diameter—the larger the better, just in case you hook a big one.

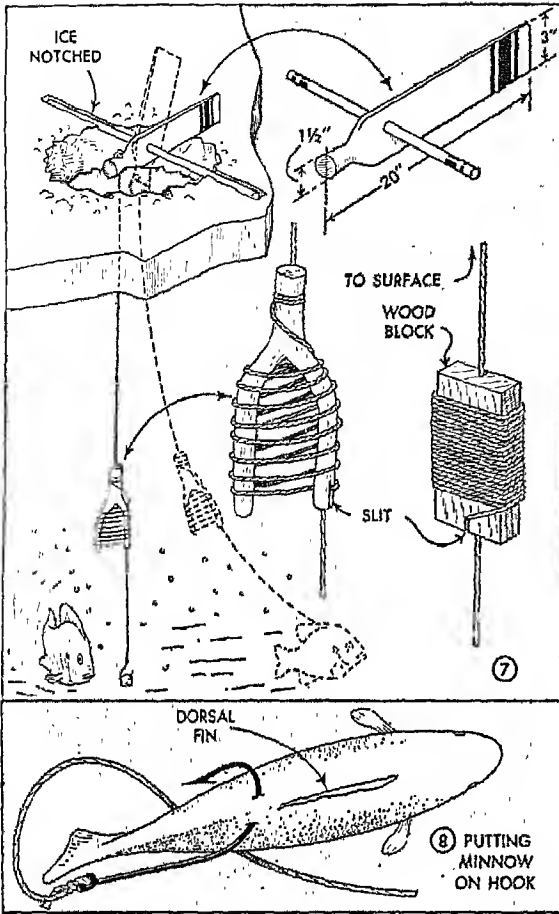
The secret of fishing—in open water as well as through the ice—is to offer as little resistance on the line as possible so that when the fish strikes there will be no tug to warn it away before it is hooked. For this reason, the line must not be too heavy, and the bobber should be small, light and easy for the fish to pull under. For crappies, perch and other light fish, a 9 or 12-lb. test line is best, with a nylon leader testing about 4 lbs. A balsa-wood plug is ideal for



a float. The line is held to it by rubber bands at its narrow end, Fig. 2, permitting it to be moved as desired, and BB-size split sinkers are attached to the leader, spaced about 4 to 6 in. apart to submerge nearly all the bobber so that the end projects only about an inch above the water. Porcupine or celluloid quills make even lighter-weight bobbers. These can be bought ready to use, with a fine wire loop or eye attached to one end for inserting the line, or they can be prepared as shown in Fig. 3. A simple rod and reel can be made from a chair leg by sawing off parts of two rungs and

then inserting a sharpened spike in one end of the leg as shown in Fig. 1.

Fig. 7 shows a method of making fast a line to an "announcer" or automatic "tip up." This is a blade of hardwood thinned at the end for lightness and pivoted on a length of dowel which is placed on the ice across the hole so that when a fish is hooked the blade swings up to record the catch. To break the impact of a strong strike and permit the fish to "run," either a crotched stick or a wood block can be used as a reel attached to the announcer. The line is wound around the reel and inserted in a



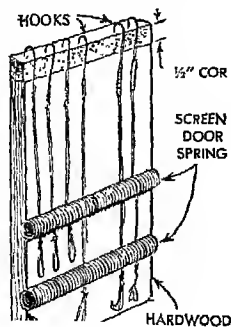
knife-blade slit in the lower end so that when the fish strikes and makes its run, the line will unwind for some distance until the fish slows down.

As bait, mud minnows, chubs or shiners about 1½ in. long are generally used for crappies, perch and other small fish. Grubs, tree-borers and slugs also make good bait, and may be obtained, even in winter, by digging open dead limbs and rotting tree trunks. Otherwise, pea-size balls of unsalted, white pork fat will do. For northern pike, larger live minnows are best to use. There should be enough clearance between the hook barb and the stem so that the minnow does not become jammed and unable to swim, and the hook is usually inserted back of the dorsal fin through the flesh, as in Fig. 8, but not deep enough to penetrate the spine and paralyze the minnow so it is unable to move.

A sneak-bent hook with a definite side rake, such as the eagle-claw or falcon-grip, is preferred for small fish such as crappies and perch. For heavy fish the hook should be correspondingly stout, and for northern pike, the so-called spear-point hook is recommended because the long point holds the fish securely.

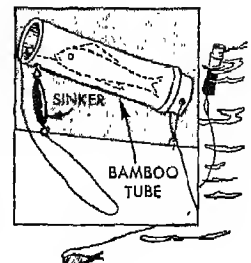
Protective Holder for Fishhooks Prevents Damage to Tackle

Snelled fishhooks can be kept in this holder and they will not become tangled or damaged, as often occurs when they are kept loose in the tackle box. The panel is a piece of ½-in. or ¾-in. hardwood 4 in. wide by 10 in. long. To hold the hooks, a ½-in. strip of cork is glued to the top of the panel. Two flutes are cut in the wood to hold screen-door springs. Hooks with shorter snells fit into the top spring and the longer ones fit into the bottom. The exact position of the springs is determined by the length of snells you use.—Harold New York



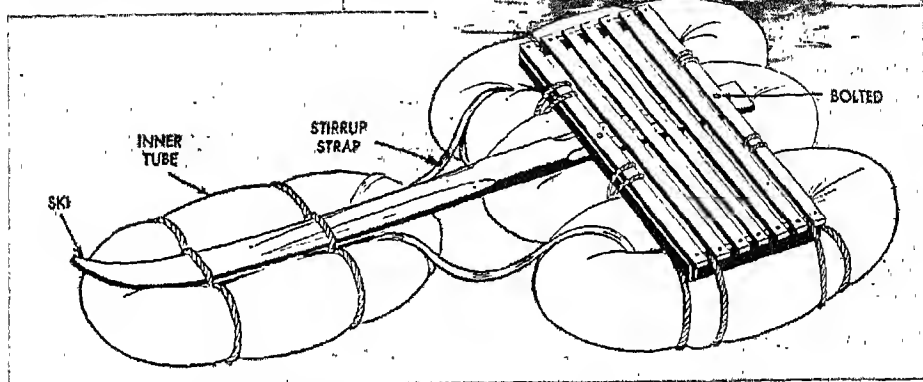
Live Bait Cast in Bamboo Tube Is Not Torn From Hook

The problem of casting live bait without having it torn from the hook was solved by a Wisconsin sportsman who placed it inside a bamboo tube as shown. The tube is made by cutting out a section of bamboo near a joint so that the tube is open only at one end. The casting line is tied to this end. To the other end is tied a short line carrying the hook and sinker. The minnow is hooked through the gills and dropped tail first into the tube, which then is filled with water and cast like a ball with the hand, not the rod. The tube protects the minnow, which swims out when the tube hits the water. The sinker keeps the hook underwater and the tube acts as a float.



Improvised Fishing Raft Transported Easily

With four inner tubes, some rope, two straps, a ski and a light wooden platform you can improvise a fishing raft that will get you out where the fish are biting. And when you have your catch, it's an easy matter to disassemble the craft and stow it in your car. Three of the inner tubes are lashed together to support the platform that serves as a seat while the fourth is tied to the tip of a ski that serves as a longitudinal member for the raft. The platform is bolted to the ski and can be taken apart for ease in transportation. Although not shown on the drawing, a stabilizing fin attached to the ski at the tip and



another at the rear will add to the craft's maneuverability. The two stirrup straps are used as foot rests should the water be

a bit chilly. The raft will handle best if a double canoe paddle is used, but a single paddle will do.

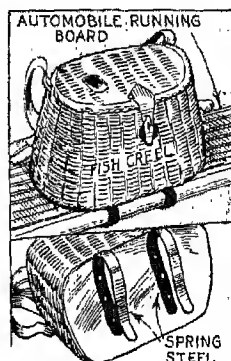
Removable Band Slipped on Hat Keeps Fishing Flies Handy

Instead of sticking fishing flies in his hat band and then removing them when through fishing, one sportsman keeps them in a removable band, which he carries in his tackle box and slips over his hat. Any band of cloth can be used, but a band cut from the crown of an old hat is ideal. If too small, the band can be stretched by notching, as shown.

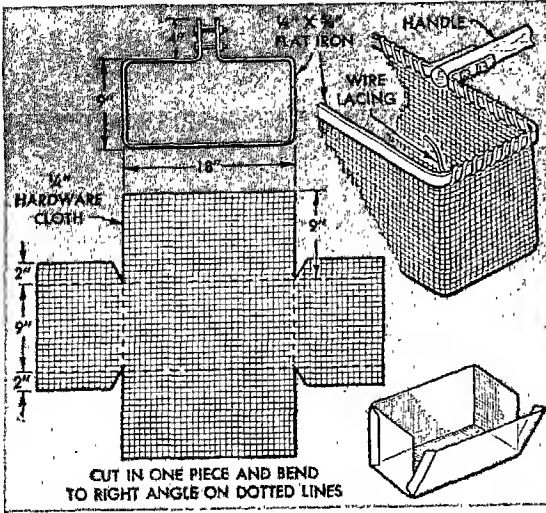


Spring Clips Fasten Fish Creel On Auto Running Board

To provide a means of carrying his creel of fish home without putting them inside the car, one fisherman riveted two spring-steel clips to the creel so it could be slipped over the running board. In this way, the fish odor does not enter the car.



"Weedless" Dip Net Made From Hardware Cloth



For netting fingerlings under grassy banks, around tree roots or aquatic plants, or just dipping up minnows from open water, this rigid net has several advantages over other types. It will withstand a lot of rough usage because it's made of metal and attached to a sturdy wood handle. The frame is bent from flat iron and fastened to the handle with small bolts as shown in

the details. Then, from hardware cloth, cut a single piece of the shape and size indicated. Bend this to a rectangular, boxlike shape, solder the overlapping corners and lace it to the iron frame with wire, using a simple over-and-under lacing and pulling each loop tight. A coat of green enamel will make the net less visible in the water. The handle should be about 6 ft. long.

Live-Bait Minnows Can Be Carried in Glass Fruit Jar

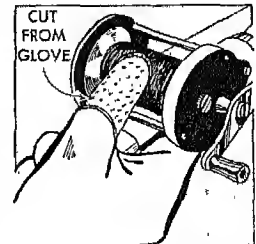
When fishing in midstream and using live minnows for bait, the necessity of making a trip to shore every time bait is needed can be eliminated by using a glass-

jar container that will carry five to six minnows. Fill a pint jar half full of fresh water and screw on the lid to make it airtight. A cord, which slips over the shoulder, is fastened around the neck of the jar. Bait kept this way will remain alive for an hour or more.

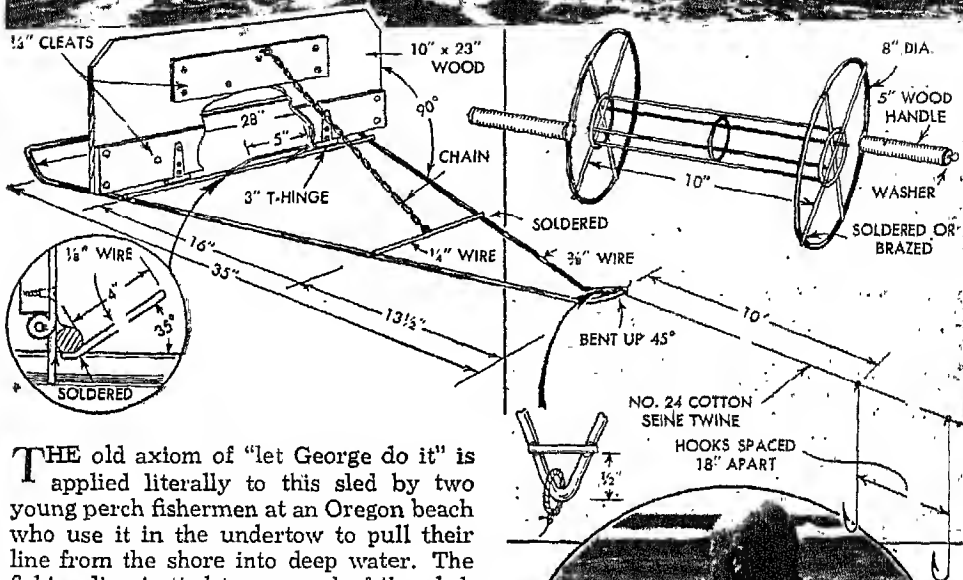


Leather Thumb Gives Protection

One fisherman wears the thumb cut from a leather glove when casting. This serves as protection when "thumbing" the reel. The material should be leather, since cotton or any similar fabric material would not overcome the heat generated by friction of the line, and rubber would have too much braking action.



❏ Picnic salads can be served cold if packed in a double boiler with ice in the outer container.



THE old axiom of "let George do it" is applied literally to this sled by two young perch fishermen at an Oregon beach who use it in the undertow to pull their line from the shore into deep water. The fishing line is tied to one end of the sled, which is placed in the water near the shore where it is 1 or 2 ft. deep. The undertow catches the pivoted flap and slowly moves the sled into deep water. The flap is pivoted with two hinges which are soldered to one of the cross braces. To prevent the sled from moving shoreward should it be caught by an incoming wave, the flap is hinged so that it will fold forward to an angle of 35 degrees where it is held by a wire support until the undertow again raises it to a vertical position, a light chain holding it in this position.

The sled is made from a length of heavy galvanized wire bent to a triangular shape and braced with three cross wires soldered in place. Bending up the ends of the sled at an angle of 45 degrees prevents it from catching on the bottom of the sea.

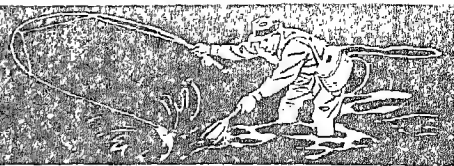
A reel for pulling in the line and sled at regular intervals is made of heavy wire



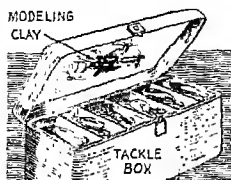
as indicated in the upper right-hand detail. The reel is fitted with two handles located at opposite sides of the reel ends for easy cranking action. However, any reel of suitable size and strength can be used instead if desired.

—R. Tarshis, Portland, Ore.

Reel Tips



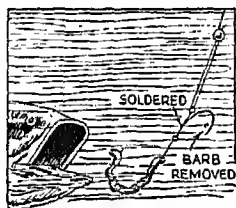
Modeling Clay Holds Fishhooks On Lid of Tackle Box



To keep his favorite flies and hooks conveniently at hand in a tackle box, one fisherman inserts them in a piece of modeling clay stuck to the underside of the lid. In this way, the hooks do not tangle and are much easier to remove than when stuck in a cork or a piece of rubber.

Fish Can't Swallow This Hook

If you have experienced the annoyance of having a fish swallow a hook so that it was almost impossible to remove it, try using a hook made like the one shown. This consists of a regular hook with a smaller one soldered onto it in a reversed position. This will serve as a stop regardless of how the bait is taken.



Sinker Removes Snarls in Fishline



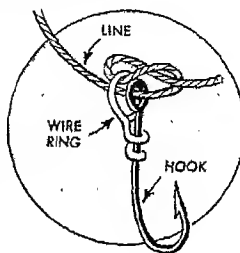
The next time your fishline becomes snarled and knotted, try this simple method of freeing it quickly. Open one eye of a lead sinker and use it as a hook to pick out the tangles and knots.

Waterproofing Minnow Seines

Minnow seines and landing nets can be waterproofed if green cedar bark is available. The net or seine should be boiled for about an hour in a solution that contains this bark. This is not only a waterproofing treatment, but also it will serve to prevent rot and keep the threads of the net soft and pliable.

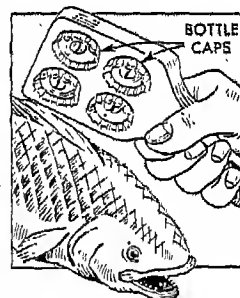
Ring on Fishhook Grips Line

Formed into an eye and twisted around the shank of a fishhook, a short length of light wire will grip the line so that it cannot loosen and become untied. This method is especially suitable for lines made of plastics and similar material, which may become slippery when wet. When the line is tied, the ring clamps against it to prevent loosening.—L. Meehan, Toronto, Ont., Can.



Improvised Fish Scale Remover

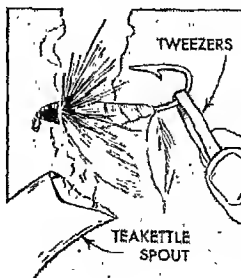
If you are on a fishing trip and have no scaler, one can be improvised from a wood block and four bottle caps. Just shape a handle on the block and screw or nail the caps to it.—Isadore M. Fenn, Chicago.



Minnows Kept Alive With Iodine

One fisherman found that he could keep minnows alive much longer when transporting them if he placed six or eight drops of iodine in the water as soon as the fish began to show signs of distress due to lack of oxygen.

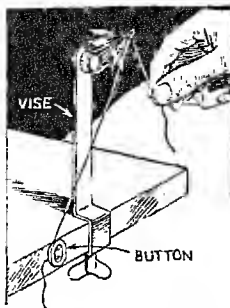
Steam Bath Restores Fishing Flies



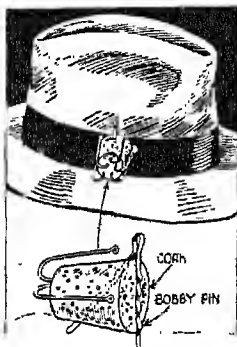
If your favorite fishing flies are matted and bedraggled, you can restore their fluffiness by steaming them. This is done by holding the fly over a teakettle spout with tweezers.—D. E. Horn, River Forest, Ill.

Button Aids in Tying Flies

Nailed to the base of a fisherman's fly vise, a large button serves as a holder for the end of the thread to keep it taut when desired. The button is pulled up tightly, and in use the end of the thread is merely given a few turns around it. This makes it easy to attach or release the thread.



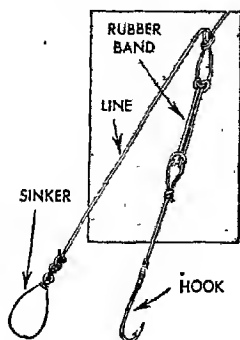
Fishhooks Carried on Hat Band By Bobby-Pin Clip



Extra hooks are kept handy by one fisherman who sticks them in a cork and clips it to his hat band. The clip is a bobby pin with one prong bent and inserted through the cork, leaving the other one to serve as a clip over the band.

"Shock Absorber" on Fishline Breaks Impact of Hard Strike

Fish with tender mouths often tear out the hook under the impact of a sudden strike or when making a run. To prevent this, a rubber band can be installed between the leader and line to absorb the shock.



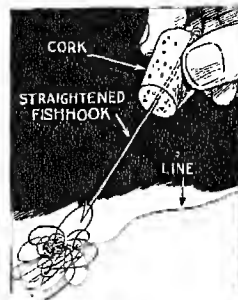
Fish Grilled Between Two Stones

To grill fish or meat without a cooking utensil use two fairly large flat stones and four smaller ones about 3 in. high. Lay one of the flat stones on the ground and place a 3-in.-high stone at each corner. Then place the second flat stone on top of these.

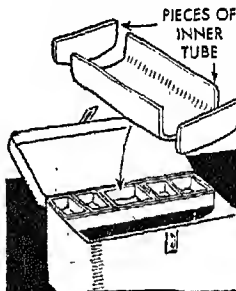
Pile dry branches around this improvised cooker; light the fire and heat the stones until they are hot. Allow the fire to die down and remove the coals from one side. With a leafy branch clean out any ashes between the slabs and slip the meat or fish between them. Cooking requires only a short time.

Fishline Untangled With Hook

If some of your fishing line becomes so tangled that it seems impossible to straighten it out, try using a fishhook for this purpose. Just straighten out the hook and slip a cork over the end. The barb will be found ideal for pulling out parts of the line in the entanglement.



Rubber Lining in Tackle Box



The enameled finish of casting plugs and the plated surfaces of spoons and spinners will be preserved if the compartments in your fishing-tackle box are lined with inner-tube rubber. Pieces are cut to

fit the sides and bottoms of the compartments and fastened in place with tire-patching cement.

Rubber Band Sheathes Fishhook And Keeps Line Tight on Pole

Wrapped around the end of a fishing pole, a rubber band is a good place to keep the hook from dangling when carrying the pole. Sheathing the hook also prevents the line from unwrapping.



Simple Methods of Preserving Fishing Tackle



MODEL-AIRPLANE CEMENT SEALS AND PROTECTS
THREAD BINDINGS ON CASTING FLIES

A little time spent occasionally on caring for your fishing equipment will be well worth while in making it last longer and give the best of satisfaction, especially on tackle that is difficult or expensive to replace. For example, your valued feathered baits will be less likely to disintegrate if a film of model-airplane cement is kept on the threads that bind the feathers, Fig. 1. This treatment also is good protection for the wrapping on gutted hooks. Another thing to keep in mind is the care of your casting rods. One of the most common causes of damage to tubular-steel rods is rust inside them. On all rods of this type, except the telescoping ones, rust can be effectively checked by coating them inside with a film of linseed oil. On rods of open-end construction, the application is simple. Just hold your finger over the lower end while oil is poured in at the upper end to fill the rod as in Fig. 2. Then, by standing the rod up to drain, the interior will be completely coated and fully protected. Servicing the one-piece tubular-steel rods is not quite so easy, but they can be protected by drilling a tiny hole through the side at a joint for the introduction of oil. After the inside surfaces have been coated thoroughly with oil, the hole should be plugged with solder. For preserving your



② USE OF LINSEED OIL INSIDE TUBULAR SECTIONS
OF RODS WILL CHECK RUST



③ AUTO TOUCH-UP ENAMEL IN BRIGHT COLORS IS
IDEAL FOR REFINISHING PLUGS

casting plugs, you will find auto touch-up enamels handy, Fig. 3. These are available, in many colors, at most auto-parts stores.

Catching Fish Bait After Dark

After dark, worms are found in abundance on a freshly sprinkled lawn, but they are hard to catch because they withdraw to their holes when a white light is flashed on them. If a square of red Cellophane is fastened over the lens of a flashlight, the worms will be easier to approach since they are not so sensitive to red light. The same is true of crickets and grasshoppers.

Separating Fishing-Rod Ferrules

To separate fishing-rod ferrules that have corroded so badly the rod cannot be taken apart without damaging it, apply a few drops of carbon tetrachloride to the joint and allow it to penetrate and dissolve the corrosion. After a half hour or so, the rod can be separated. Then polish the corroded spots with a fine grade of emery cloth and finally coat with light oil.

PART II



for the
HUNTER

Here's Your HUNTING KNIFE

CUT

RED HEAT
(750° F.)

PATTERN PAINTED
ON FILE

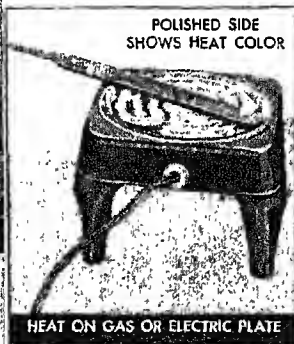
BLUE HEAT
(550° F.)

KNIFE BLADE IS MADE
FROM 10" MILL FILE.
TEMPER CAN BE
JUDGED VERY ACCU-
RATELY BY COLOR

Under the rusty exterior of an old file there's high-grade steel to make a sturdy, razor-edge hunting knife. Rough-polish one side for a surface on which to observe tempering colors. Heat the tang to a full red and watch the blade portion change from straw color to brown, then to purple and blue. When blue shows, remove from heat and let the work cool in air. Shape and bevel the knife by grinding carefully, dipping it in water constantly to prevent heating. Smooth the rough-ground surface on a sander. For the handle, shape the bolster from soft metal, drive it in place and add leather and plastic washers with glue between them. Squeeze up with a nut and fit the threaded tip. Then shape the handle by filing and sanding carefully while the knife is held in a vise or a lathe.

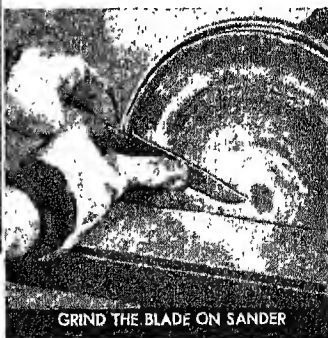


POLISH TO SHOW TEMPER COLORS

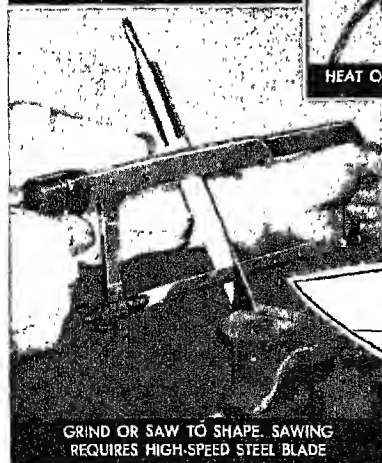


POLISHED SIDE
SHOWS HEAT COLOR

HEAT ON GAS OR ELECTRIC PLATE



GRIND THE BLADE ON SANDER



GRIND OR SAW TO SHAPE. SAWING
REQUIRES HIGH-SPEED STEEL BLADE

FAST
TAPER

VERY
SLIGHT
TAPER

SHARPENING BEVEL

$\frac{1}{8}$ "

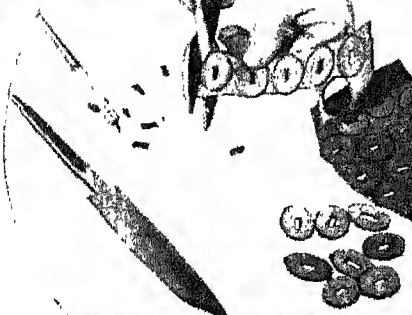
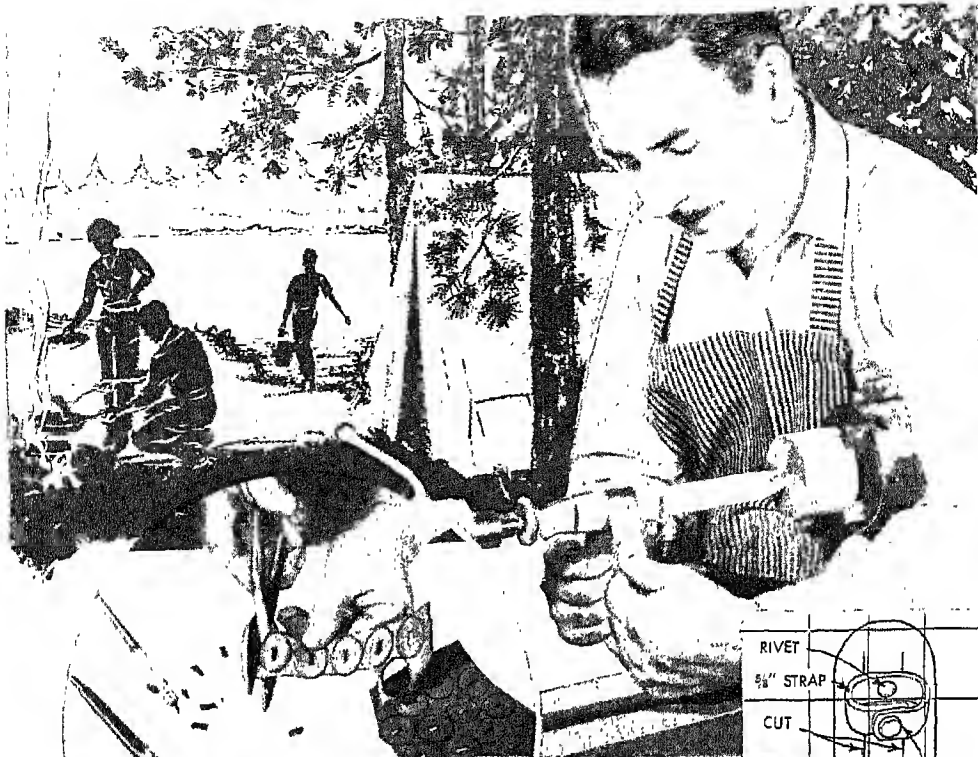
$\frac{1}{8}$ "

SECTION

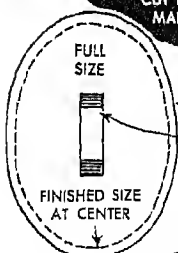
TAPER

SHARPENING
BEVEL

Use this full size pattern



CUT LEATHER WASHERS TO
MAKE TOTAL THICKNESS
OF $2\frac{1}{2}$ "

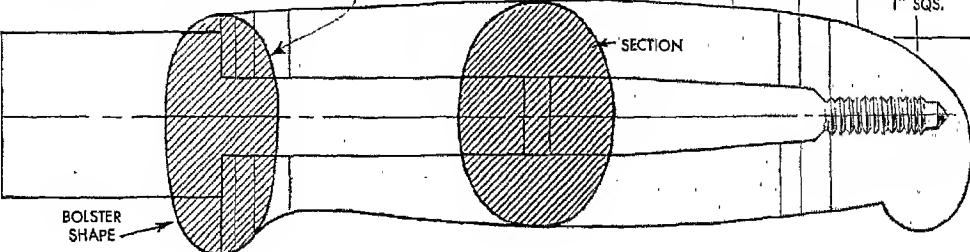
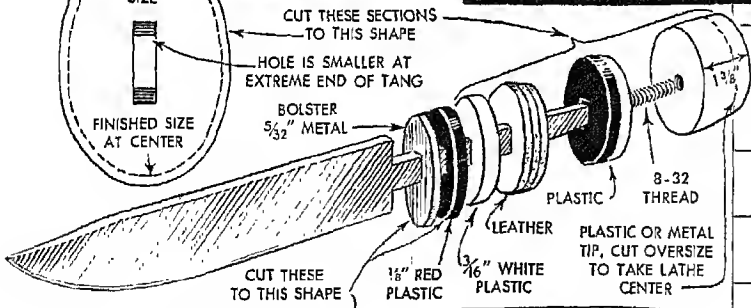
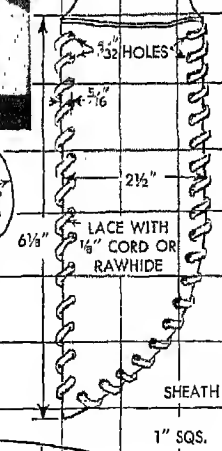
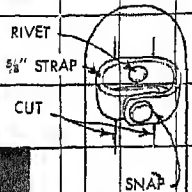


CUT THESE SECTIONS
TO THIS SHAPE
HOLE IS SMALLER AT
EXTREME END OF TANG

BOLSTER
 $\frac{5}{32}$ " METAL



SHEATH: DRILL HOLES FOR LACE



SHOTGUN CHOKES

By W. Clyde Lamme



1 POPULAR SHOT SIZES Chilled Shot

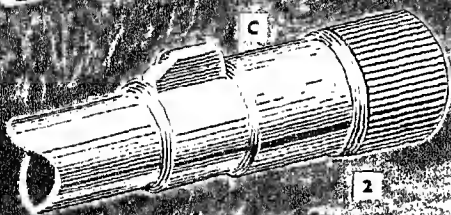
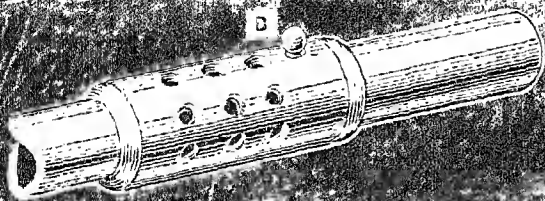
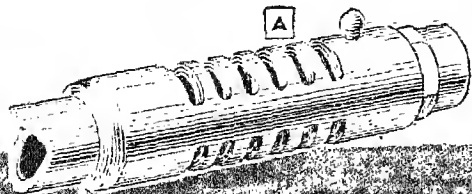
No.	No. in Oz.
10	868
9	585
8	409
7½	345
7	299
6	223
5	172
4	136
3	109
2	89
1	73

Left, popular shot pellets are shown in comparative sizes. Common loadings include sizes ranging from No. 9, a standard skeet load, to No. 4, loaded in 2½ and 3-in. shells for long-range work

Photo by Rolands from Underwood

CHOOSING A SHOTGUN by gauge alone is not always the best way of determining its suitability and usefulness. For one thing, some good shotgunners find it difficult to get accustomed to the comparatively heavy recoil of the larger gauges, even though they may use the heavier gun over a period of time. To them the larger gauges are a definite handicap to better shooting. Such shooters should settle for a smaller-gauge gun of lighter weight or a gun of the auto-loading type which gives less recoil. In the long run they will bag more game. Others, to whom recoil is no handicap, object to the comparatively heavy weight and slower swing of the big-bore shotguns.

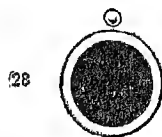
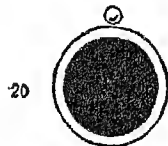
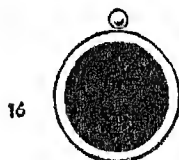
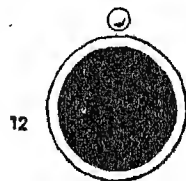
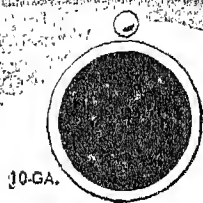
AND GAUGES



Variable choke devices fitted to single-barrel guns give consistently uniform patterns and some types known as compensators, or "brakes," aid in reducing recoil

For them the solution also is a lighter, faster gun of smaller gauge. Then there are the hardy wild-fowlers who must sacrifice something in choice to get the extra-long-range killing power generally required to bag their game under average present-day hunting conditions. These special requirements call for a heavy gun, chambered and bored to handle super-long-range loads.

The trick is in selecting the gauge of the gun to fit the personal likes, purposes and inclinations of the shooter. In some cases that's a rather large order, but for ordinary upland shooting a ratio of about 100 ounces of gun weight per ounce of shot is a good average for most shooters. Type of shotgun is optional, of course, and all high-quality shotguns are furnished in a choice of chokes, gauges and barrel lengths. Both the gauge and the choke are determined largely by the game you are after. The degree of choke determines the spread of the pattern. If you are shooting quail over dogs in thick cover you will need a medium-lightweight gun and an open boring

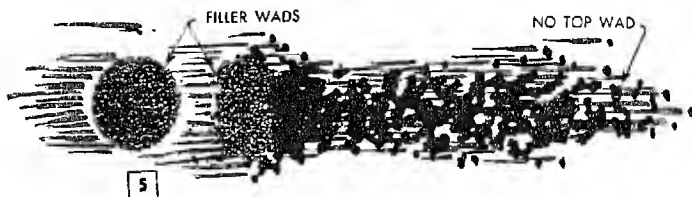


3 GAUGES IN COMMON USE



Left, high-speed photos reveal what happens to a shot charge fired from the older-type shot shell closed with a top wad and the conventional crimp. This shot charge is being deflected by the top wad—may form a "cartwheel" pattern as in Fig. 9

Right, shot charge in flight a few inches from the gun muzzle. Note uniformity of shot column. Fired from a shell with the newly developed flat crimp which eliminates the separate shot wad



Courtesy Remington Arms Co. Inc.



6 .410 AND 28 GAUGE 25 YDS.



7 20 GAUGE 30-35 YDS.

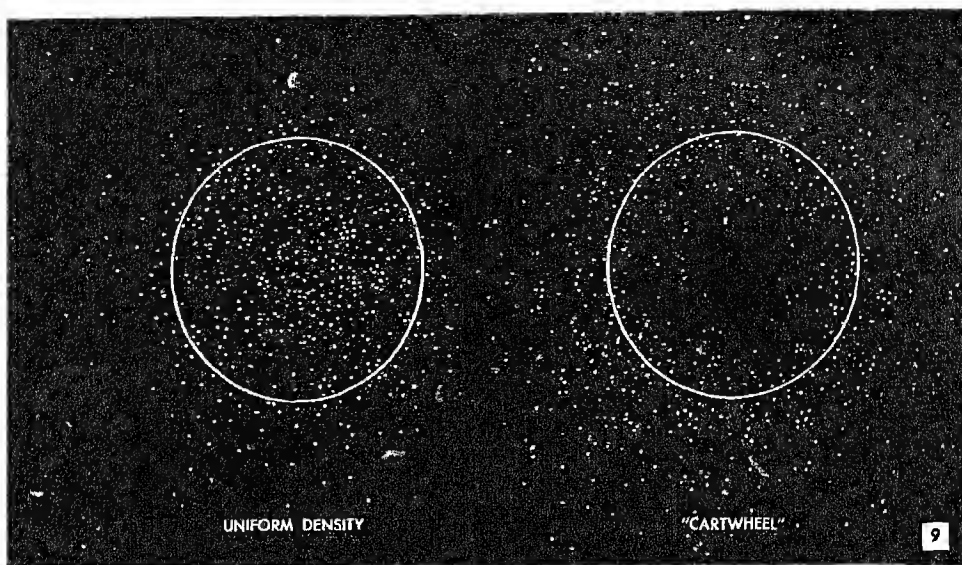


8 12 GAUGE 40-60 YDS.

to give wide-spreading shot patterns. On the other hand, if you are shooting at passing ducks or geese, driven pheasant or doves, the average ranges will be much longer. For this work you'll need a somewhat heavier gauge choked to throw a tight pattern at greater distances.

In the double gun with side-by-side barrels or the over-and-under type with superposed barrels, you can have two degrees of choke in the same gun without additional fittings. But with any of the single-barrel shotguns in single-shot, pump action or the auto-loading type you have only one barrel and, of course, only one degree of choke. The alternatives are to have interchangeable barrels fitted to the gun, each with a different choke, or any one of the three devices shown in Fig. 2, A, B and C, attached to the original barrel. Any of these latter accessories is good, the first two, A and B, giving exceptionally uniform patterns of varying density and spread merely by changing the choke tubes. In addition, the open body of this device, which is permanently attached to the barrel, allows gases to dissipate more rapidly in a lateral direction, thus materially reducing the recoil. The third, detail C, is simply a choke-changing device and is the handiest of all in the field as it permits a change in pattern by merely turning the knurled ring. Index marks indicate the various degrees of choke. However, this accessory does not reduce the recoil of the gun.

A recent development in shot shells eliminates the top, or shot, wad by a new process of crimping. By use of the high-speed camera researchers verified what had long been suspected—that the top wad was the cause of spotty shot patterns. Notice in Fig. 4 how the top wad is breaking up the shot column only a few inches



Courtesy Remington Arms Co., Inc.

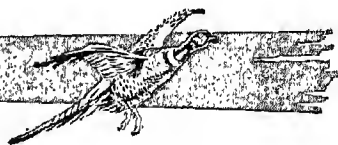
es from the muzzle of the gun. This early
breakup of the shot column often results in
the formation of open-center patterns
shown in Fig. 9. Fig. 5 is a copy of a high-
speed photo showing a shot charge fired from
a shell with the new flat-top crimp. This im-
provement in shot-shell loading has been
found to give consistently uniform patterns in
barrels bored with varying degrees of choke.

When you consider density of pattern, shot
size in relation to gauge is of some impor-
tance. Notice in Fig. 1 how the number of shot
pellets per ounce falls off as the shot size in-
creases. In 1 oz. of No. 4 shot, for example,
there are less than half as many pellets as
there are in 1 oz. of No. 7½ shot. A 10-gauge
takes 1½ oz. of shot while a 12-gauge gun
handles 1¼ oz. in the standard 2¾-in. shell;
the 20-gauge takes 1 oz. of shot while the
.410-gauge handles ¾ oz. of shot in the 3-in.
shell. From this you can compare easily the
variations of pattern density when different
sizes of shot are used in gauges ranging from
the smallest to the largest, assuming, of
course, the same degree of choke in each in-
stance. The 10-gauge gun, Fig. 3, although
still preferred by many wild-fowl hunters,
has been largely supplanted by the 12-gauge
chambered for 3-in. shells. These heavy load-
ings in specially bored barrels make the 12-
gauge gun effective at ranges up to 60 yds. or
more. Figs. 6, 7 and 8 show average ranges at
which various gauges are considered most
effective. The figures given do not in any case
represent the extreme ranges. Effective
ranges of those gauges between 12, 20 and .410
will vary only slightly.

Shotgun barrels vary somewhat in pattern
percentages, the common basis of reckoning



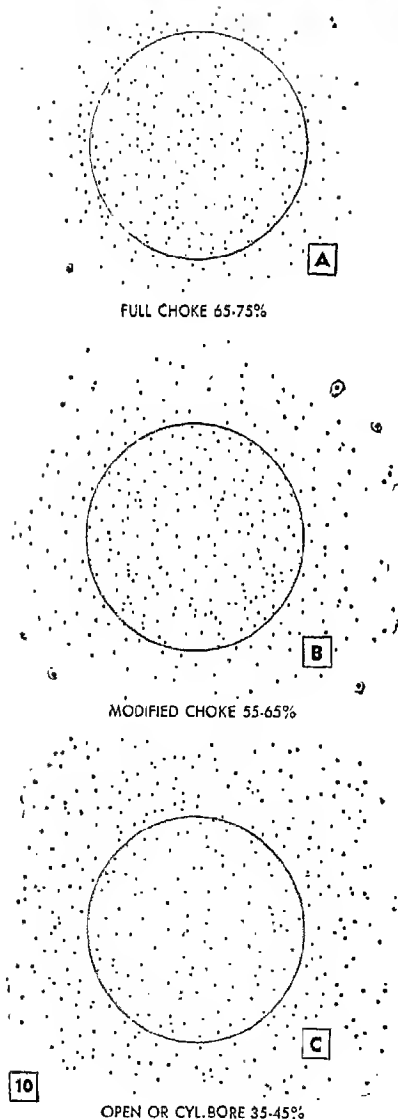
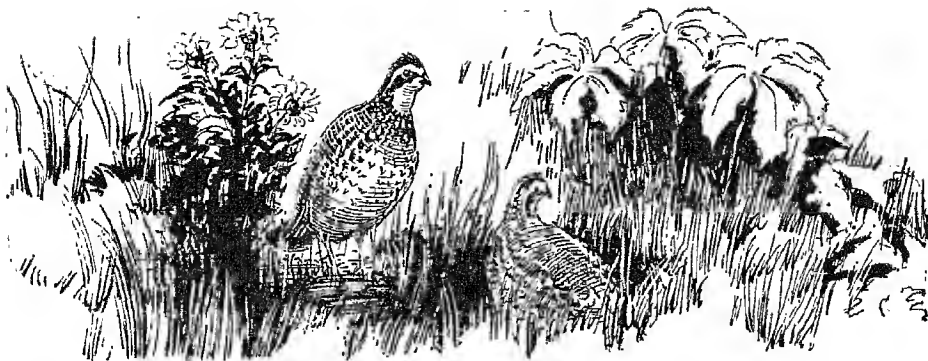
For quail and other small game birds taken
in heavy cover at ranges under 40 yds., you'll
need a light gun with open-bored barrels for
fast handling and wide pattern spread. The
20-gauge gun is a good all-around choice



As a rule pheasant and other large upland
game birds found in more open cover flush
at greater distances. To bag these birds con-
sistently you need a heavier gauge, larger
shot and a somewhat tighter barrel boring

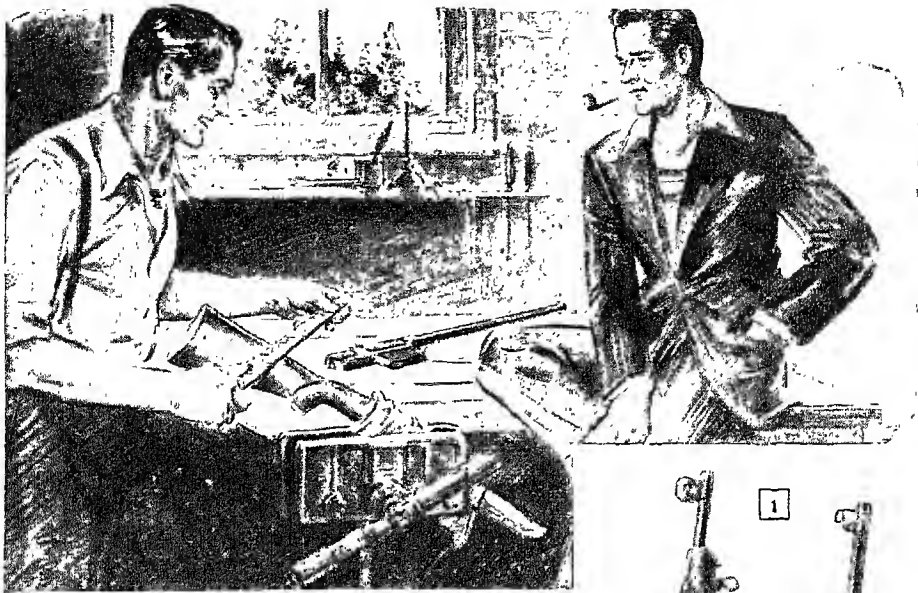


Average duck and goose shooting calls for
a gun of the larger gauge, close choke boring
and heavily loaded superlang-range shells



being the number of shot pellets placed in a 30-in. circle at 40 yds. Some full-choked barrels, Fig. 10 A, will hold 75 percent of the shot charge within the circle at this range, using a given shot size. Varying the pellet size will often give different results in the same barrel. For this reason it's a good idea to test a new gun to determine which shot size it patterns best. To do this, cut a number of sheets from heavy paper, each about 48 in. square and paint a 4-in.-dia. black circle on each one to serve as an aiming point. Set up a single sheet on a supporting frame 40 yds. from the muzzle of the gun and fire one test shot at each sheet, using a shell loaded with different size pellets for each test. After each shot draw a circle 30-in. in diameter around the area on the paper containing the greatest number of perforations made by the shot charge in passing through the target. You may have to repeat this test several times in order to determine what shot size gives the most consistently uniform results in the particular gun you are testing.

There is some difference of opinion among shooters as to the proper shot size to use on various game birds. For smaller birds such as quail and doves, most experienced hunters use small shot sizes ranging from No. 7½ to No. 9. For shooting medium-sized game birds, such as grouse and pheasant, shot sizes ranging from No. 4 to No. 7½ are an average choice. Large birds difficult to kill cleanly generally call for the use of the larger bores and shot sizes ranging from No. 4 to No. 1. However, it is density and uniformity of the pattern that count, rather than the shot size. Some shooters prefer the smaller shot sizes even for the larger birds, relying on the density of pattern given by the smaller pellets rather than the greater killing and ranging power of the larger individual pellet. Fig. 10 C shows roughly about what you can expect in shot patterns from full choke, modified choke and cylinder-bore barrels. Percentages for modified choke and cylinder bores also are frequently given as 45-55 and 25-35 percent, respectively.



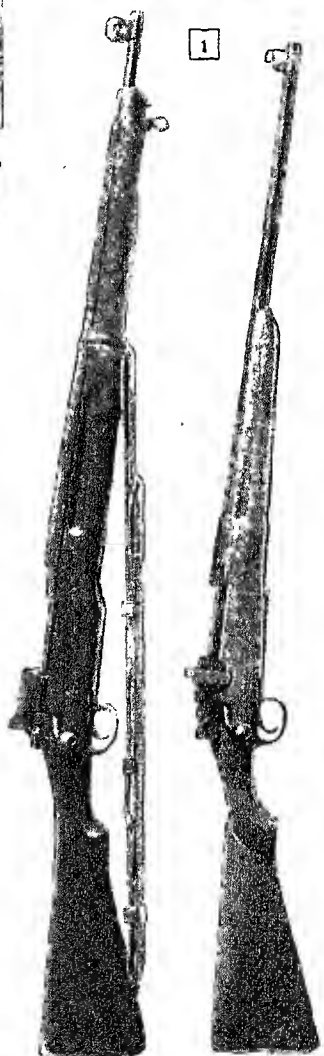
RIFLE CONVERSION

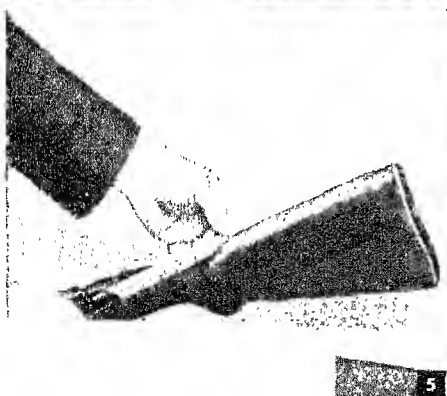
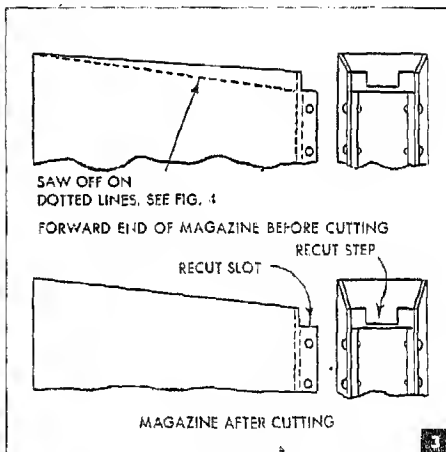
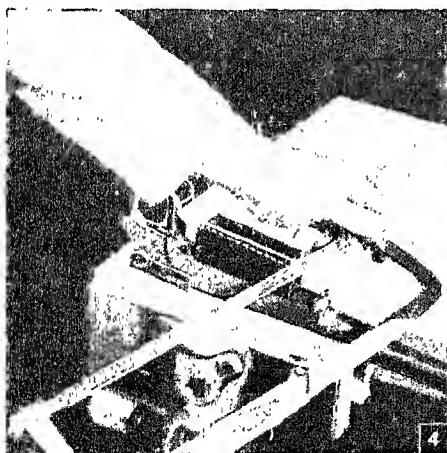
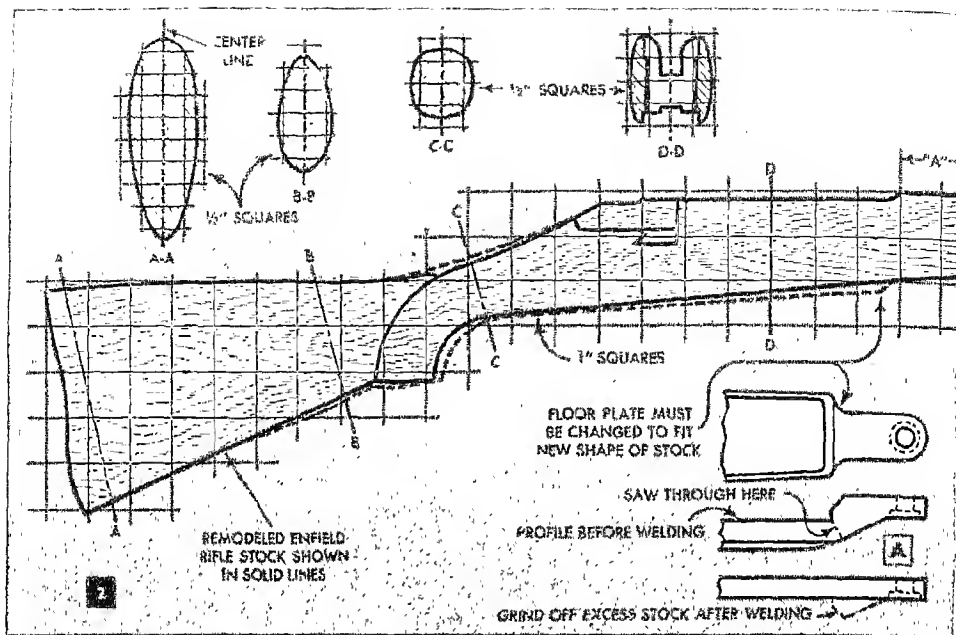
By reshaping the stock and making other minor changes you can make a fine sporting rifle from the Model 1917 Enfield

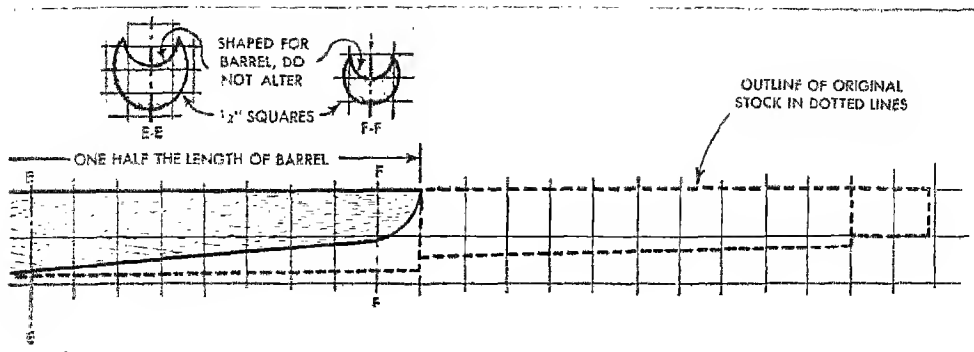
By Edward R. Lucas

THERE'S A GOOD, high-power sporter just underneath the rough, military exterior of the Enfield rifle. Briefly, all you have to do to convert it to a sporting rifle is remove the barrel cover, cut away a portion of the stock, and take off an eighth of an inch or so of wood here and there. This will provide a neat and serviceable rifle on which can be mounted almost any sighting equipment suitable for big-game hunting.

Before doing any work, there are several points to consider. The pull length or the drop of the original stock can't be altered easily except by the use of leather comb and butt pads, but you can determine the fore-end length quite easily. Some riflemen have a longer reach than others and they grasp the fore end well forward, especially when taking quick, off-hand shots at running game. One should take this point into account before cutting the fore end to length. Ordinarily a fore end one half the length of the barrel, Fig. 2, will be about right. Also, if you want to install a barrel band for a forward sling swivel you should consider the position of the band with relation to the fore-end length. Another thing is the height of the comb at section B-B in Fig. 2. Although the Enfield stock is quite straight the comb height at this point may be a little low for some shooters. You can either build it up by flattening the stock from the grip back to the heel and gluing on matching wood, or shape it as indicated and then raise the comb to desired height







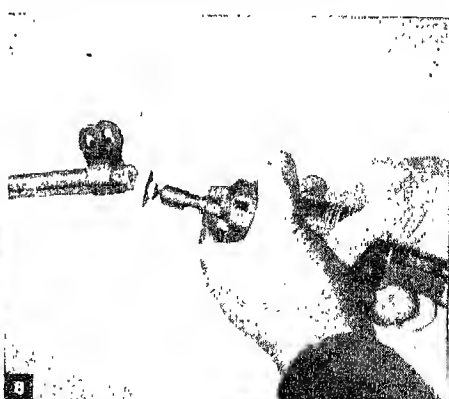
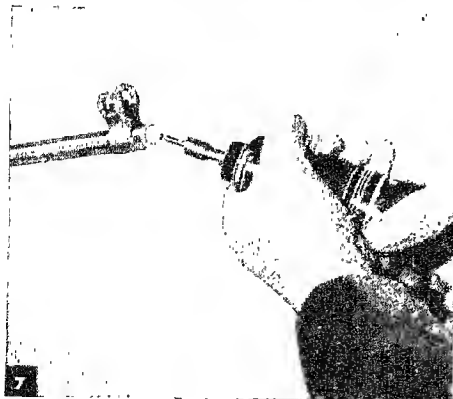
with a cheek pad of the lace-on type. Of course, using the former method would make it necessary to fit a new butt plate of the type used on sporting rifles.

First disassemble the rifle, removing stock, barrel cover and sights. Then make a full-size template of the stock profile, following the solid lines in Fig. 2. Also make templates of one half of the sections A-A, B-B, C-C and D-D. Saw off the fore end square at the point determined. At some points where considerable wood is to be removed a sharp spokeshave can be used. This is faster than a wood rasp. Check frequently with the sectional templates to be sure that you do not cut below the curves. Don't try to finish to exact dimensions with a spokeshave. Come down only part way to remove most of the excess wood, then finish up with a fine rasp and sandpaper. You can't remove all of the finger groove on each side of the fore end without getting the wood too thin at the breech ring. There will be a little of the finger groove left as shown in the right-hand view of Fig. 1. Notice in Fig. 2 that the underside of the grip and the top of the tang are cut down considerably from the original profile. Here care is required because you are working directly across the grain and at an angle with it in a comparatively small area. A

strip of fine-grit abrasive cloth 1 in. wide is ideal for finishing the rounded surfaces.

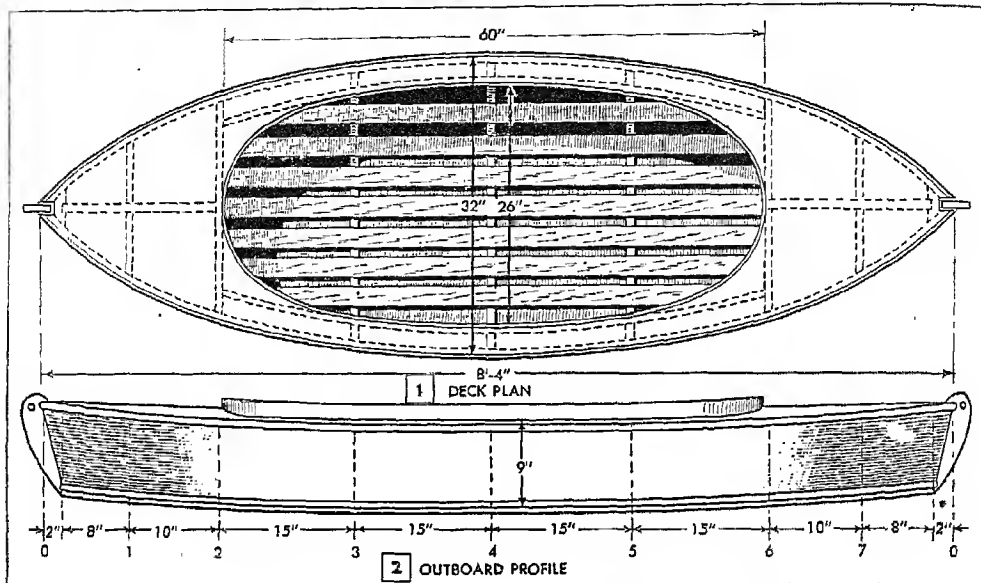
The magazine floor plate is altered as in Fig. 2, details A, so that it will fit flush with the new profile of the stock. A gunsmith or expert welder can do this job. Before sawing, transfer the location of the two holes to a piece of flat steel. Later, after sawing, this will serve as a welding jig. Both parts can be bolted to it. The floor plate must be reblued. Next, the magazine is altered as in Figs. 3 and 4. The final alteration is chamfering the step at the rear end of the magazine follower so that the bolt can be closed easily when the magazine is empty. Do this with a file as in Fig. 6.

Leaving the barrel its original length generally is recommended, but some riflemen prefer a shorter barrel for hunting. Some cut it back to 22 in. It's recommended that this be done by a gunsmith but you can cut the barrel with a hacksaw and then countersink and crown the muzzle as in Figs. 7 and 8. Use the greatest care not to damage the rifling in this operation. Before you use the rifle have a competent gunsmith check the head spacing. This is important, not only as an aid to accuracy, but is a safety precaution as well. A rifle with excessive head space may be dangerous to fire with standard ammunition.



Featherweight

AN EIGHT-FOOT DUCKBOAT

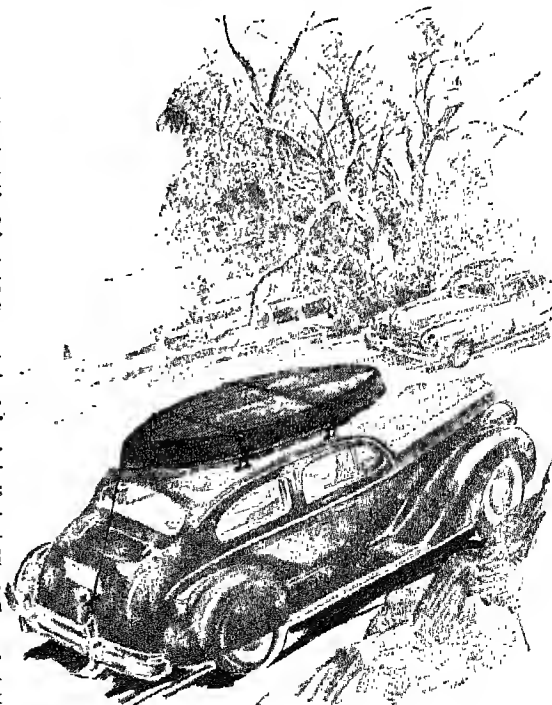


By Hi Sibley

LIGHT ENOUGH to carry on a car or even on your shoulders, this boat will enable you to reach hideaways that are inaccessible with heavier craft. It is sturdy enough to push through dense weed growths and light enough to navigate the shallowest waters. Although only 8 ft. 4 in. long, Featherweight has a capacity of well over 300 pounds. Its construction of $\frac{1}{4}$ -in. waterproof plywood over light pine framing gives it the well-proportioned lines that are shown in Figs. 1 and 2.

Featherweight is built upside down on an erecting frame as shown in Fig. 8. Construction begins with the boat frames, Fig. 4. These are made of $\frac{3}{4}$ -in. (net) pine or other light wood that will not split easily. Full-size patterns drawn on heavy wrapping paper will aid in laying out the pieces to exact size and serve as a guide for assembling them after they are cut. Waterproof glue and No. 8 brass screws are used to join the parts as indicated in Fig. 3. Temporary braces are installed on the open frames 3, 4 and 5.

The strongback of the erecting frame, Fig. 11, is made from a 2 by 8-in. plank. A $\frac{7}{8}$ by $\frac{1}{8}$ -in. batten may be used to mark

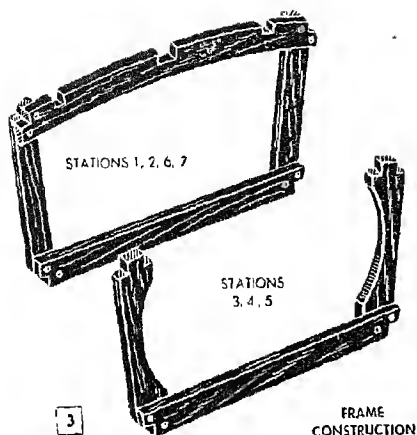




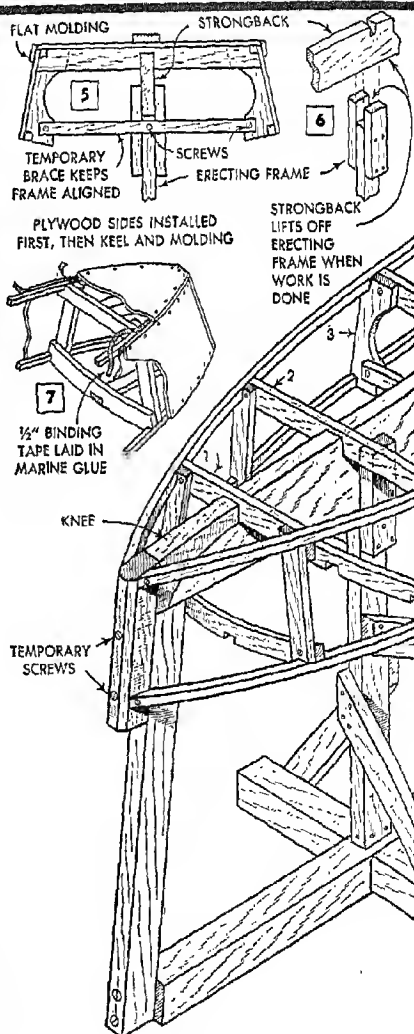
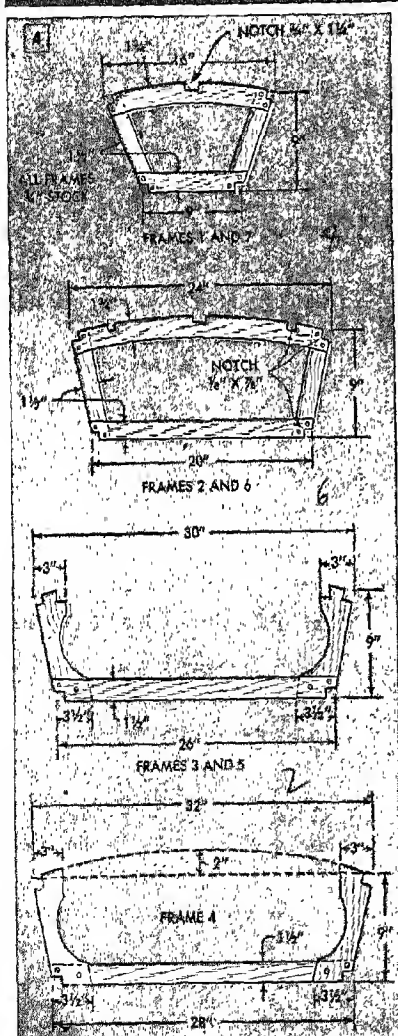
the 2-in. curve. Notches are cut to hold the boat frames in position and the ends are shaped to take a bow and stern knee as shown in Fig. 10. Almost any type of bracing on the erecting frame will be satisfactory provided it is rigid and does not interfere with the work. The framing lumber should be well seasoned so it will not warp and cause the boat to become lopsided. The perspective view, Fig. 8, shows the entire assembly in full detail. Note in Fig. 6 that the framing is built so that the strongback can be lifted off with the boat frame when the work is completed in this position. When assembling the frames on the strongback be sure the uprights, or side members of the frames, are on opposite sides of

their cross members, beginning amidships as shown in Fig. 8. The temporary brace on the No. 4 frame is screwed to the erecting frame as in Fig. 5 to keep it squared and centered. The other frames are held in place by toenailing at the sides of the strongback. Care should be taken to locate the nails where they can be removed easily after the sides and bottom are put on. With the frames in place, the boat stems, one of which is detailed in Fig. 9, are temporarily screwed to the erecting frame as in Fig. 11. Both stems should be about 12 in. long to permit trimming to exact size later.

To install the sheer battens, temporarily nail them in the notches of the No. 4 frame. Then bend the ends of the battens around



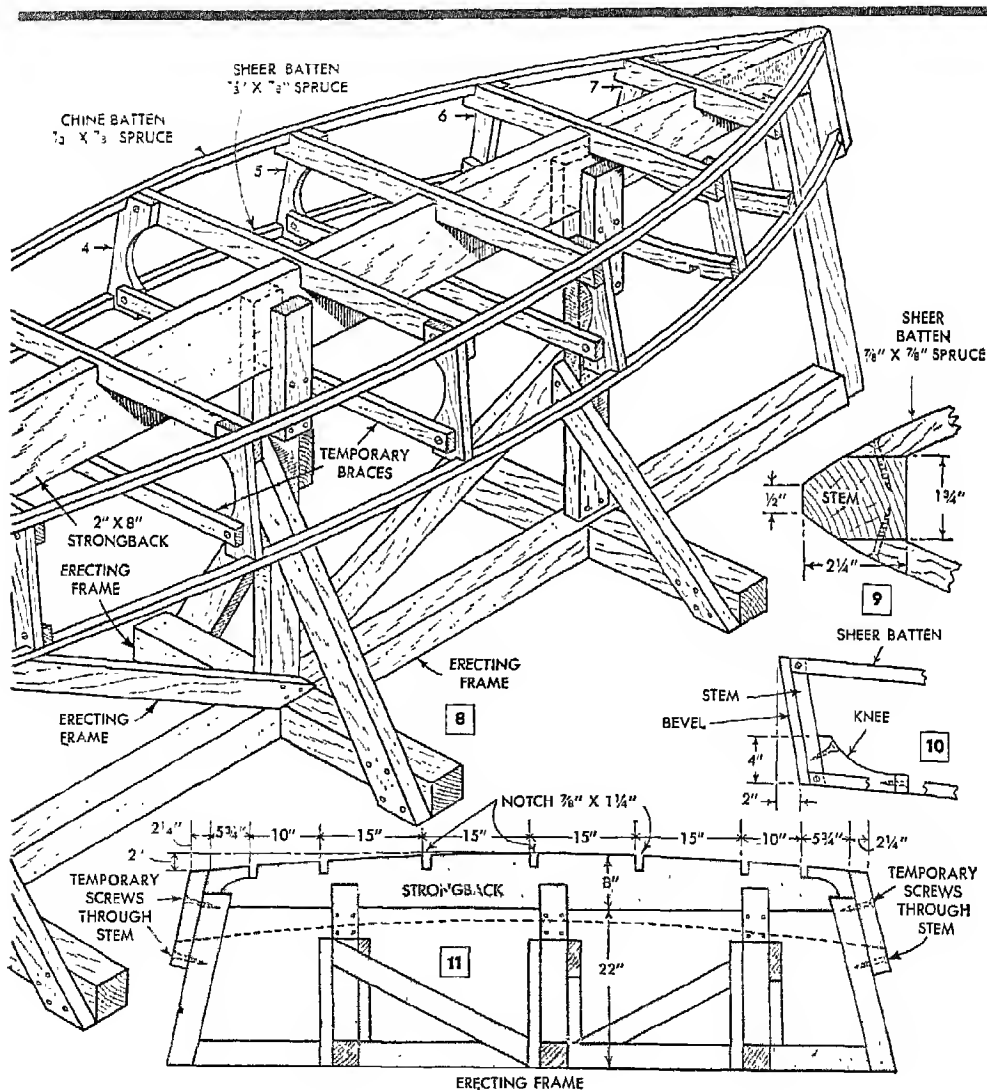
to the stems and mark so they will fit just back of the bevels as indicated in Fig. 9. After cutting to size, install the battens permanently with screws and waterproof glue. Fasten them to frame No. 4 first, and then work progressively toward the stems, securing both sides alternately. Check all the frames for squareness before fastening the sheer battens. Chine battens are installed in the same way. To assure a watertight hull, screws must be countersunk and the battens planed flush with the frames. The plywood covering must be in snug contact with the sheer and chine battens and bevels of the stems. To install the sides, bend and

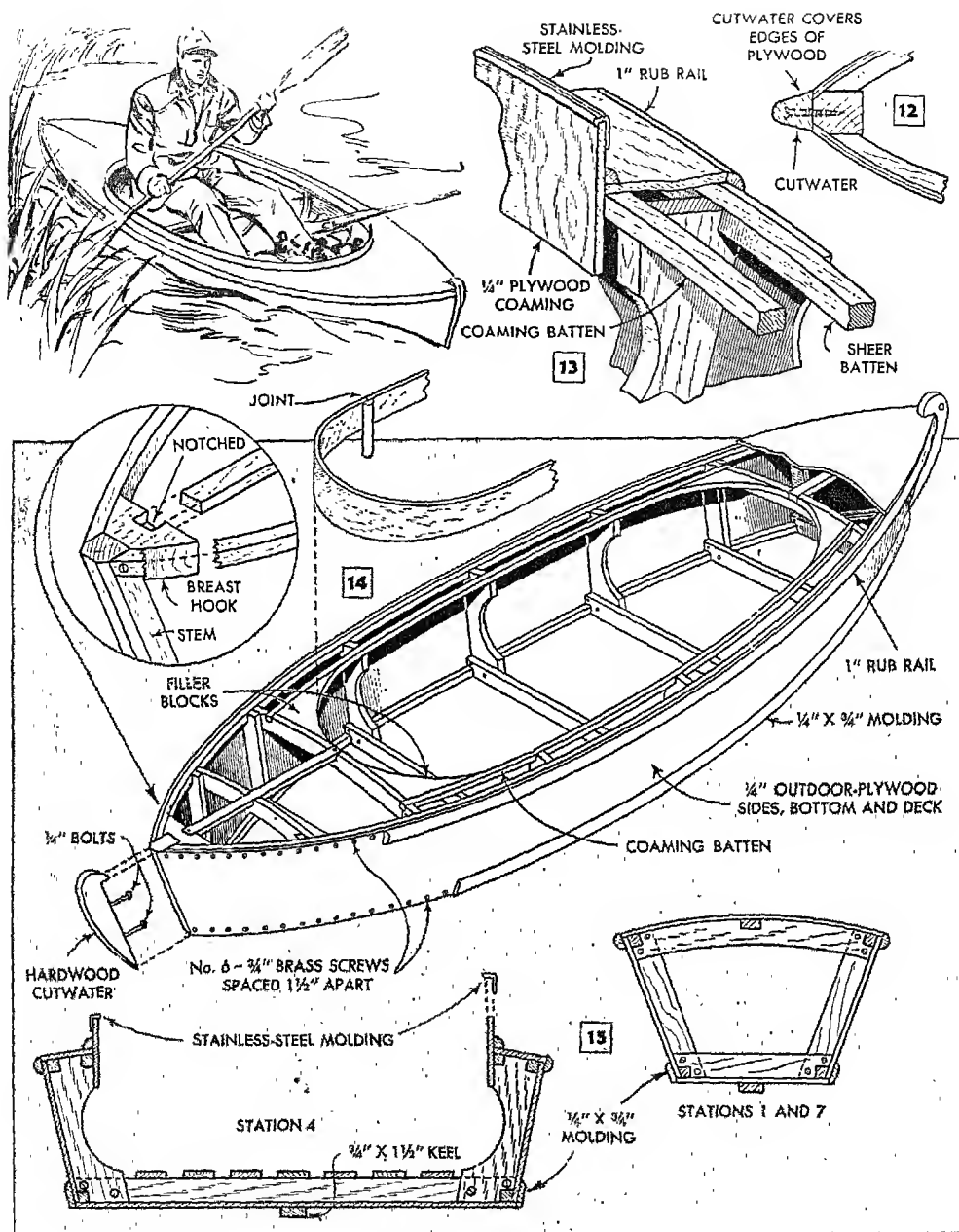


clamp a panel of plywood around the entire side of the frame and mark it along the sheer, chine and stem. Then remove and saw outside of the lines to allow for trim. Cotton binding tape $\frac{1}{2}$ in. wide is laid in marine glue applied to the battens, stems and side panels as in Fig. 7. The sides are nailed temporarily to the frame amidships and screwed alternately each way from this point to the stems. Care should be taken to prevent the binding tape from shifting. After the edges of the side pieces have been planed flush with the chine batten, lay on the bottom panel of plywood and mark it for sawing. This is installed in the same manner as the sides. With the bottom finished, set the keel and fasten with 2-in. No.

10 galvanized screws to the frames and knees. To cover the edge of the bottom plywood, as well as the screwheads in the sides, install flat, wood moldings at the chine lines as indicated in Fig. 15. The temporary screws in the stems are then removed, and the hull, together with the strongback, lifted off the erecting frame and placed right side up on sawhorses.

The strongback will have to be sawed in half to get it out of the hull. A false bottom or floor as shown at station 4, Fig. 15, should be made an individual unit so it can be removed to clean the bilge. Deck beams, extending from the cockpit to breast hooks fitted in the bow and stern, are installed in the notches cut in the upper members





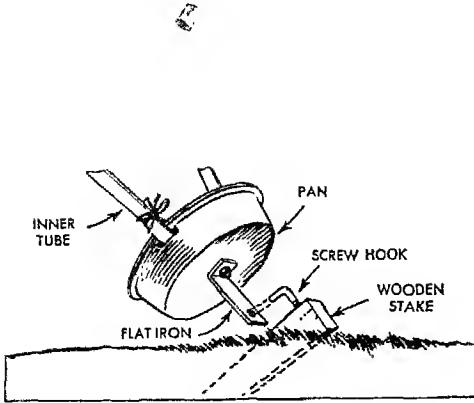
of the fore and aft frames as indicated in Fig. 14. Coaming battens and filler blocks are then added to support the deck and plywood coaming around the cockpit.

The entire deck may be cut from a single panel of plywood with the cockpit area sawed out, or, if too awkward to handle in one sheet, it can be made from two pieces and joined at the No. 4 frame. Plywood is also used for the coaming, which is made in four sections and joined with a reinforcing strip at frames 3 and 5. A stainless-steel

molding as shown in Fig. 13 will protect the top edge of the coaming. To make a watertight joint with the deck, lay a quarter-round molding in marine glue and fit it as snugly as possible in the corner. Hardwood cutwaters at the bow and stern as in Fig. 12 and rub rails along the sheer lines complete the boat.

For an inconspicuous finish, paint the boat a cattail green both inside and outside. Then follow with two coats of spar varnish. Allow time between coats.

Between-Seasons Practice With Your Shotgun

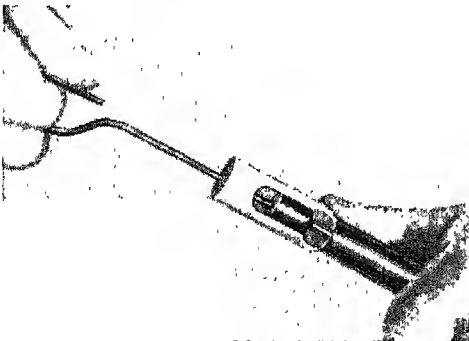


This simple "trap" throws tin cans, bottles and other small objects into the air in a high, curving flight. Getting away, the thrown object closely simulates the swift rise of a bird flushed in heavy cover, and in falling it presents an equally difficult target to the shotgun pointer—that of a live bird dropping steeply downhill. The sharp rise of the target teaches the beginner in shotgun handling the trick of swinging the gun muzzle above a rising bird, and shooting at the object as it falls is good practice in the knack of holding under a game bird dropping down from a height in a swift, curving flight. When two shooters alternate, one operating the trap, it's possible for the gunner to vary the angle of the shots by simply moving right or left or back to the range limit. The detail above shows



the construction of the trap, which is somewhat like a slingshot. Posts to which the rubber bands are attached should be spaced about 2 ft. The trap is released by pressing the iron catch off the end of the screw hook with the left foot. If you throw bottles or other glass objects locate the trap where the broken pieces will not injure anyone.

Cap Protects Muzzle of Gun While It Is Being Cleaned



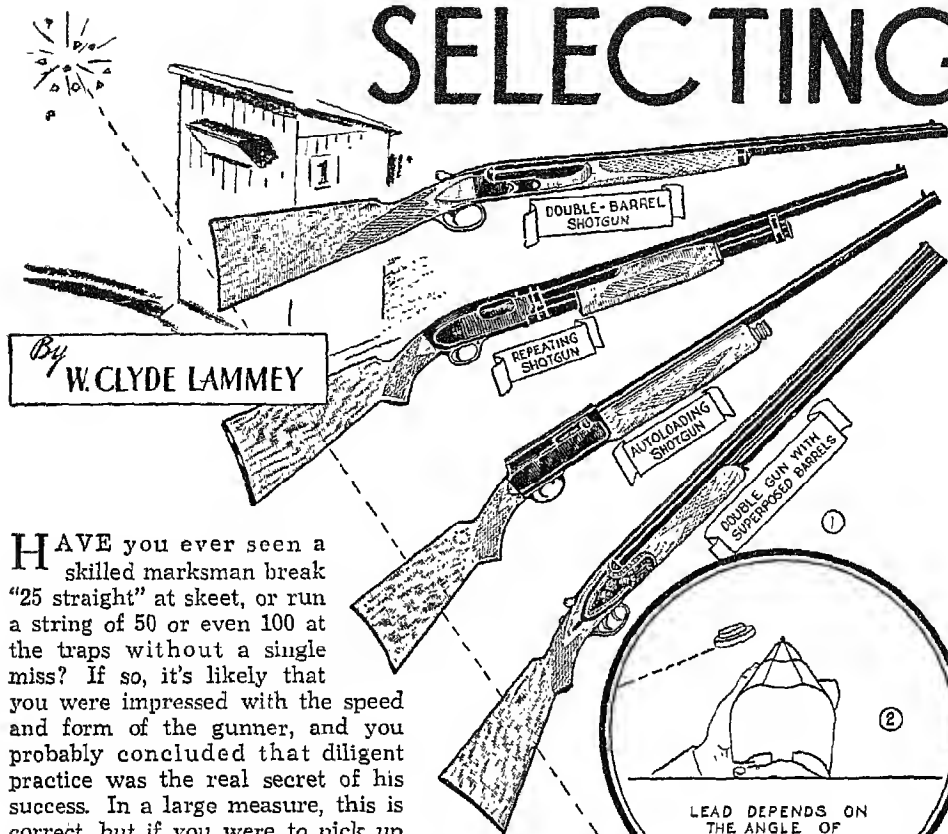
Rifles and handguns should be cleaned from the breech end to avoid wearing the muzzle and damaging the sharp edges of the lands to such an extent that accuracy

of the gun would be affected. However, on guns that cannot be cleaned from the breech, such as side-ejecting revolvers and some automatic, lever and slide-action rifles, a removable cap like the one pictured will prevent this wear. It is made from a plastic lipstick container of a size to slip snugly over the end of the barrel. The side of the container is cut out to fit around the front gun sight and the end is drilled to take the cleaning rod. This must be done accurately so that the hole is in exact alignment with the bore of the gun when the cap is in place.

How to Start a Fire in the Rain

To start a fire in the rain or snow, carry a tube of rubber cement which is highly inflammable. It will light instantly in a downpour and, unlike many other materials used for the same purpose, it can be carried easily in the pocket.

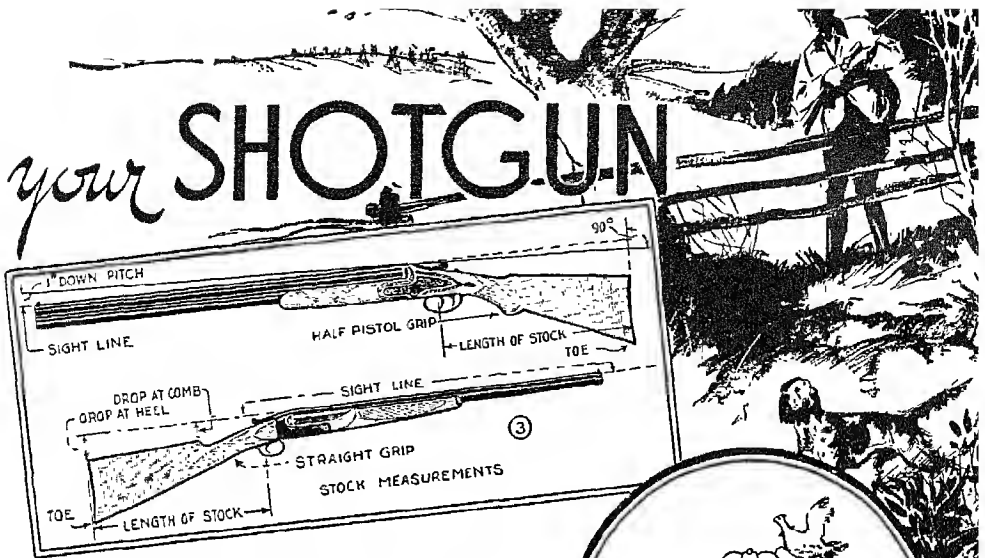
SELECTING



HAVE you ever seen a skilled marksman break "25 straight" at skeet, or run a string of 50 or even 100 at the traps without a single miss? If so, it's likely that you were impressed with the speed and form of the gunner, and you probably concluded that diligent practice was the real secret of his success. In a large measure, this is correct, but if you were to pick up his gun and throw it to your shoulder you might discover that it didn't suit you at all. Possibly you would have to make a conscious muscular effort to bring the barrel into alinement. This would slow up your speed in pointing the gun. Again, the design of the stock might cause your right hand to be cramped. In other words, the gun would not fit your needs individually, because the owner has selected it to suit his own taste and requirements, just like selecting and fitting a suit of clothes.

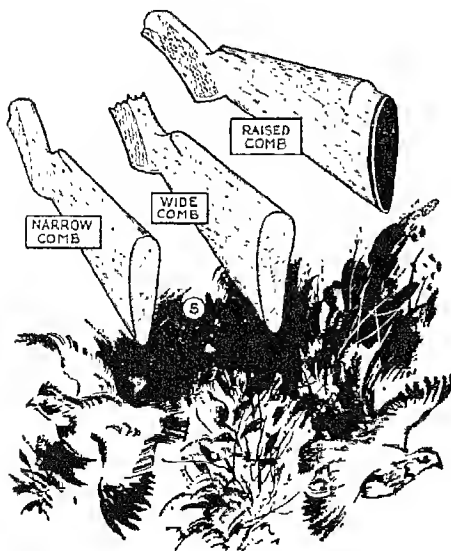
Skillful handling of a shotgun is a matter of speed. This does not mean a series of sudden, violent movements but rather a smooth, unbroken sequence of motion that gets the gun to your shoulder, your cheek on the comb, and your eyes on the object to be hit—all in a split second. Roughly, the effective range of the average shotgun is 35 to 40 yards. Because of this, the experienced gunner knows that when he steps up to a station on the skeet field and calls for his bird, or when swift-winged game flushes in the field, he must get into action instantly. In doing this his whole attention centers on the object to be hit; he is not conscious of the movements





required to bring the gun into position and fire it. You do not aim a shotgun like you do a rifle. Rather you point it, in much the same fashion that you point your finger.

Generally speaking, gun fit hinges on just three dimensions of the stock, which you will find in Fig. 3. These are the length measured from the trigger to the center of the curved butt plate, and the comb and heel drop measured in inches from the sight line. Manufacturers, considering the design of their own product, have worked out average stock dimensions that are intended to be suitable for



most shooters of average stature. Then there is the structure of the gun itself. For example, you might find a double gun, similar to that in Fig. 1, unsuited to you individually, while the repeating or auto-loading gun, with essentially the same stock dimensions, might fit exactly. This would likely be due to the variation in the type of gun rather than in the stock alone.

Now, to find out whether the gun in hand fits you individually: Sometimes this is rather difficult to determine fully at the outset. With any one of the four shotguns shown in Fig. 1, at your shoulder, go through the five positions shown in Fig. 7. In each case, the arrow indicates the direction in which the gun is pointing at the start of the swing. The foot positions are only approximations, of course, but if you practice them until you acquire the habit, they will help greatly in balancing for a quick shot. Remember that your arms must "lock" the gun to your shoulder; your feet do not move. Your body does the swinging. Now take the first two, in Fig. 7, as an example. At the start of the swing, in each case, hold the gun as in

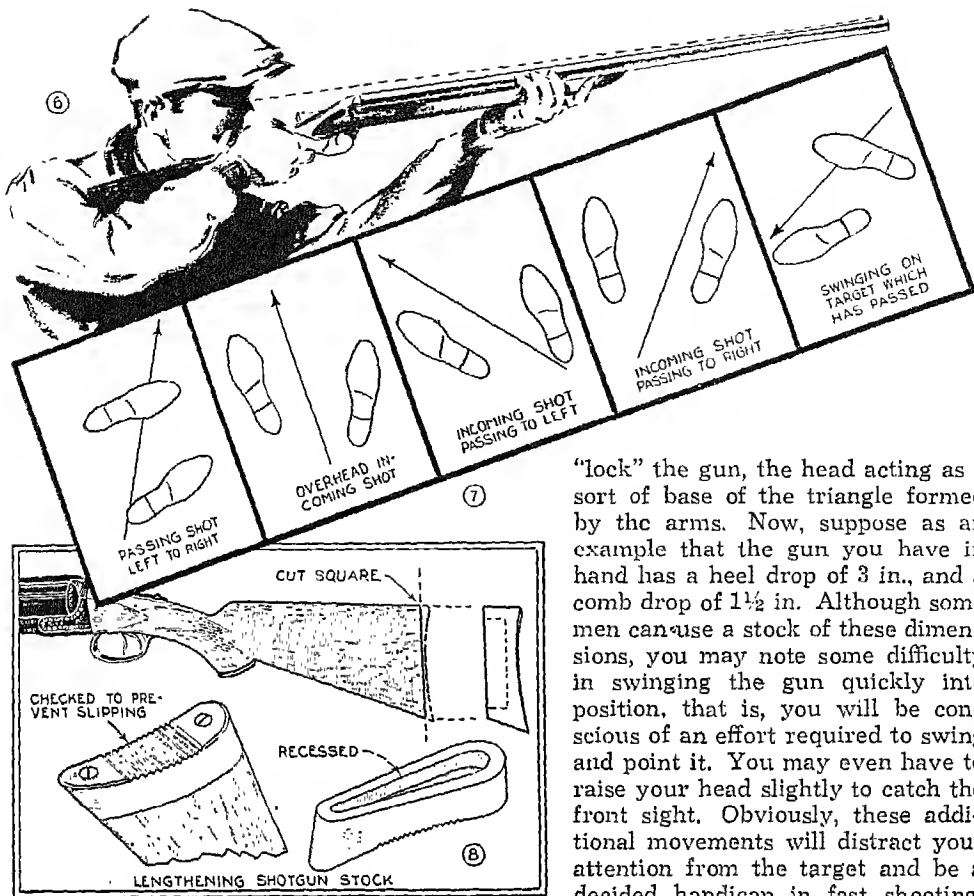


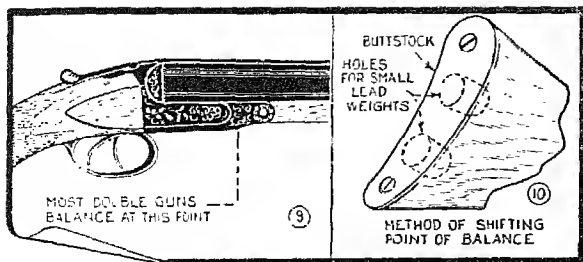
Fig. 6. In the first swing, left to right, you'll notice a gradual tightening of the muscular tension as you come around, also a more or less involuntary tendency of the cheek to slide backward on the comb. The latter will be more pronounced if the stock is too short for you, although it is not as evident as it will be when you try the second swing on an imaginary overhead incoming target. This time the cheek will tend strongly to slide forward. Some shooters take this shot with a backward body bend; others by arm swing.

Now go back to Figs. 2, 3 and 4. Most crack wing shots use a "straight" stock, which means, first of all, but little variation between the comb and heel drop, Fig. 3. Most of these shooters habitually "cheek" the gun hard, that is, the cheek is pressed firmly onto the comb in all shooting positions. This has a tendency to

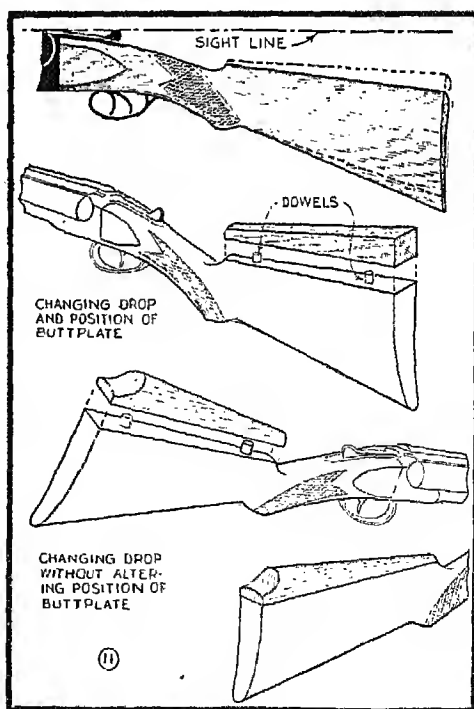
"lock" the gun, the head acting as a sort of base of the triangle formed by the arms. Now, suppose as an example that the gun you have in hand has a heel drop of 3 in., and a comb drop of $1\frac{1}{2}$ in. Although some men can use a stock of these dimensions, you may note some difficulty in swinging the gun quickly into position, that is, you will be conscious of an effort required to swing and point it. You may even have to raise your head slightly to catch the front sight. Obviously, these additional movements will distract your attention from the target and be a decided handicap in fast shooting.

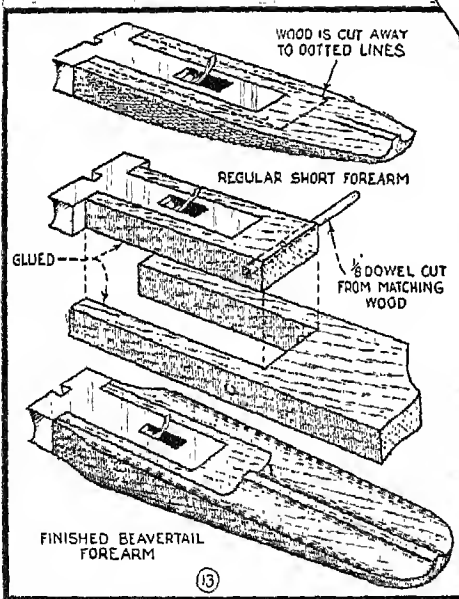
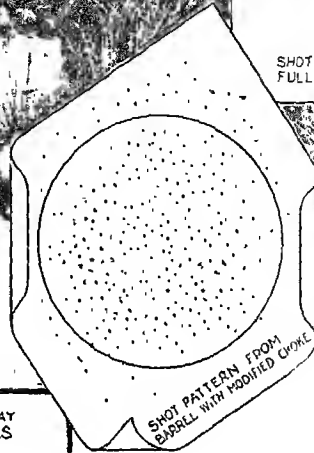
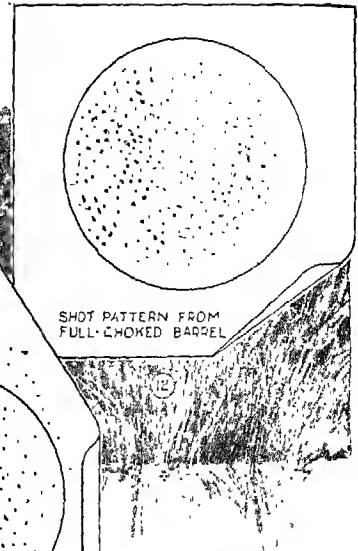
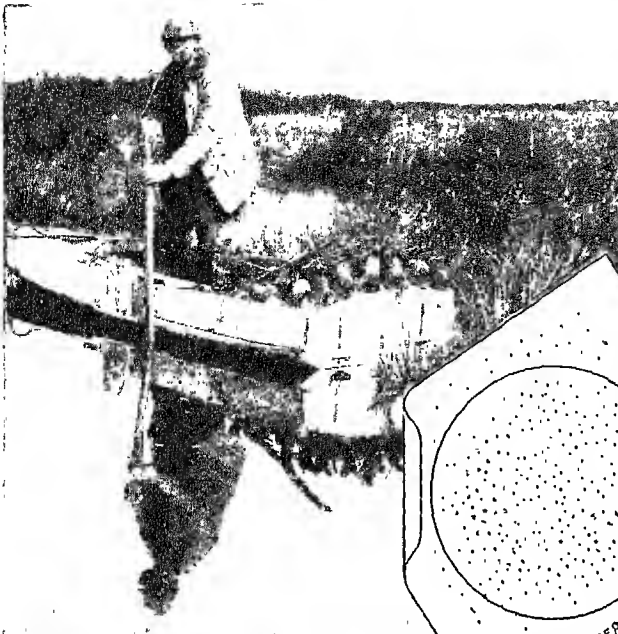
Trying the same type gun with a heel drop of only 2 in., the comb drop being $1\frac{1}{2}$ in. as before, you will probably note a difference at once. The straighter stock will bring your eye above the breech as in Fig. 6, and the barrel, or barrels, will be in full view, as in Figs. 2 and 4. Such a position enables you to judge distance and lead quickly and accurately. Keep in mind that in all tests of this kind as well as in actual shooting, you should acquire the habit of keeping both eyes open. This utilizes a principle of stereoscopes, the value of which you can easily check by closing one eye and then attempting to gauge the distance quickly to either a moving or stationary object.

Length of the stock and degree of pitch also have something to do with the "feel" of a shotgun. Most shooters find that a stock length of 14 in. is right for them. This, combined with a heel drop of 2 or



2¼ in. and a comb drop of 1½ in. will prove suitable for a majority of those of average stature. Manufacturers can usually furnish such stocks as standard on the better grades of guns. Stocks are usually furnished with a 1-in. pitch, Fig. 3, but this also varies from zero to as much as 3 in. Certain physical characteristics may make it necessary to specify a special type of comb when selecting a new gun. For instance, if you are full-faced you will probably find a narrow comb, Fig. 5, more suitable. A man with a thin face will likely find a wide or raised comb an advantage. In all this the shooter must determine for himself, by experiment, just what stock characteristics suit him best. Fig. 8 shows one way of lengthening the standard stock that is too short. A new butt plate is made of a pressed-fiber material. The butt is squared and the longer butt plate is screwed in place and worked down flush with the wood. A rubber recoil pad will also accomplish the same thing. Any reputable gunsmith can fit the latter for a nominal charge. As a rule nearly all types of shotguns balance at a point from 4 to 6 in. above the trigger as in Fig. 9. Under certain conditions it may be advisable to shift this slightly to make a gun handle better. By taking off the butt plate as in Fig. 10, and boring two or more shallow holes in the stock you can move this point forward, or, by filling one or more holes with lead the point will be moved nearer the trigger. Another stock alteration is shown in Fig. 11. Here you can do either of two things, change both drop and position of the butt plate, or change the drop alone. Either is a comparatively simple job but it must be done with care. By raising the comb and butt plate as in the first two details, you can correct a tendency to undershooting. If you have an expensive gun, it's best to





older guns the fore-end construction will permit the alteration detailed in Fig. 13. Careful fitting is, of course, necessary. The added wood will shift the point of balance slightly, but you can easily compensate for this by "loading" the butt stock as in Fig. 16.

At the present time, you can, when purchasing the better-grade shotguns, just about "write your own ticket," for they are now made with varying stock dimensions designed to suit the great majority of shooters. In addition, practically all manufacturers can, for a nominal extra charge, furnish a gun with a stock made to your own specifications. Of course, you must determine beforehand the stock dimensions that suit you individually. You also have a variety of barrel boring to choose from. These are the cylinder, or open bore, the improved cylinder, the skeet chokes, No. 1 and No. 2, the modified, the improved modified and the full choke. These terms signify the degree of choke boring. Fig. 12 shows two representative shot patterns. The modified barrel is the best all-around choice, but for quick work at close range the improved cylinder or skeet chokes are preferable.

take it to a gunsmith to have this work done, as he can probably fit a new stock made to your own specifications for little more than the alteration would cost. But if the stock is plain, straight-grained wood, you can do the job yourself. It is only in later years that the "beaver tail" forearm, or fore end, as it is also termed, has come into widespread use. Its real advantage is its greater length and width. On most

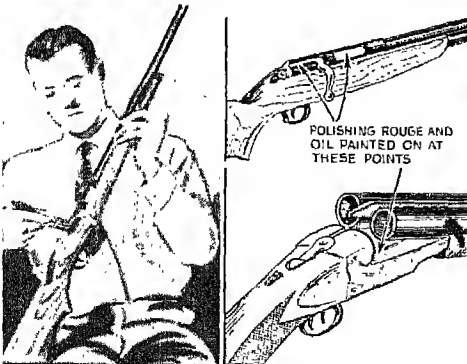
Wood Ticks Removed From Dog With Lighted Cigarette



As the danger of poisonous infection from the bite of a wood tick is due to its being pulled away so that the head of the insect remains in the animal's flesh, one hunter uses the following method of removing ticks to avoid this trouble: The lighted end of a cigarette is touched to the rear portion of the tick's body which causes the insect instantly to remove its head from the small hole that it has made in the dog's skin, thus making the tick easy to remove.

Tight Gun Action Eased Quickly With Polishing Rouge

If the action of your shotgun or rifle seems a little tight or rough, it is possible that gritty dust or other coarse abrasive

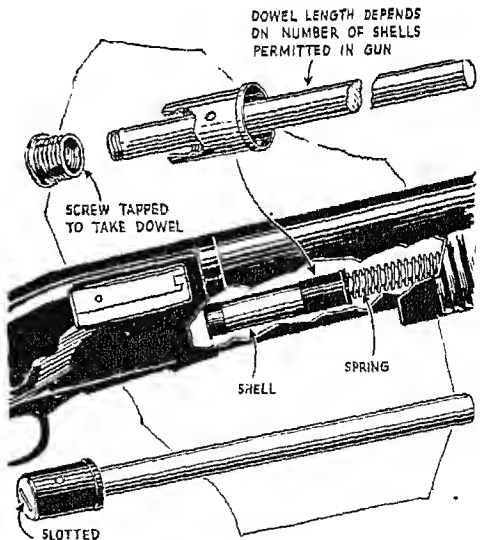


has roughened the sliding surfaces. Or, it might be that the action is normally just a trifle tighter than you like. To get that

smooth hand-honed "feel," clean the action thoroughly, then mix polishing rouge with oil to make a brushing paste and apply the mixture to those sliding parts which are objectionably tight or rough. Work the action slowly until the roughness or binding disappears. When the action is just right, dismount the parts, wash them thoroughly in gasoline and lubricate with a good quality of gun oil.

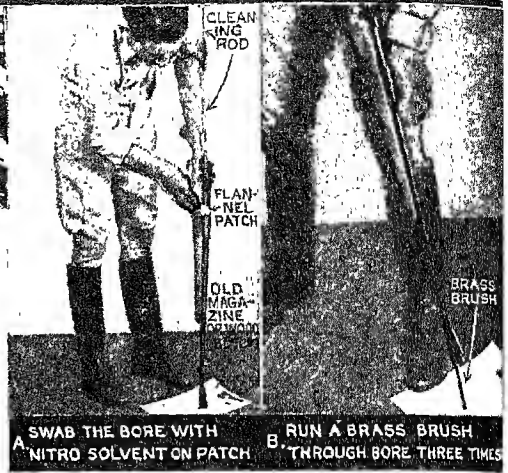
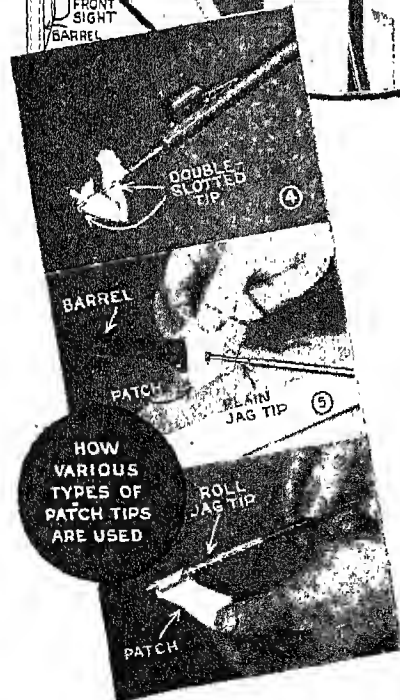
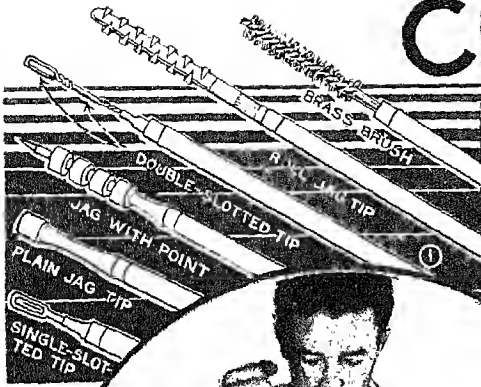
Gun Plug in Cartridge Magazine Is Easy to Insert and Remove

If you do considerable hunting with a shotgun in localities where the use of a plug is prescribed by law to limit the number of shells carried in the gun, you'll find a plug like the one shown easy to insert and remove. It is inserted from the cartridge-loading end instead of the usual way of inserting a plug from the muzzle end of the magazine. Instead of a plain length of dowel, the closed end of the cartridge carrier inside the magazine is bored out and fitted with a brass cap. This is threaded to screw inside a brass sleeve, which is a drive fit inside the cartridge carrier. The cap is bored and threaded so that the plug can be screwed into it. Then the



cartridge carrier with its brass cap is replaced in the magazine. Now, when it is necessary to use the plug, "break" the gun, remove the brass cap, insert the plug and reassemble. In this way, the plug cannot slide back and forth inside the magazine when the latter contains less than three shells.

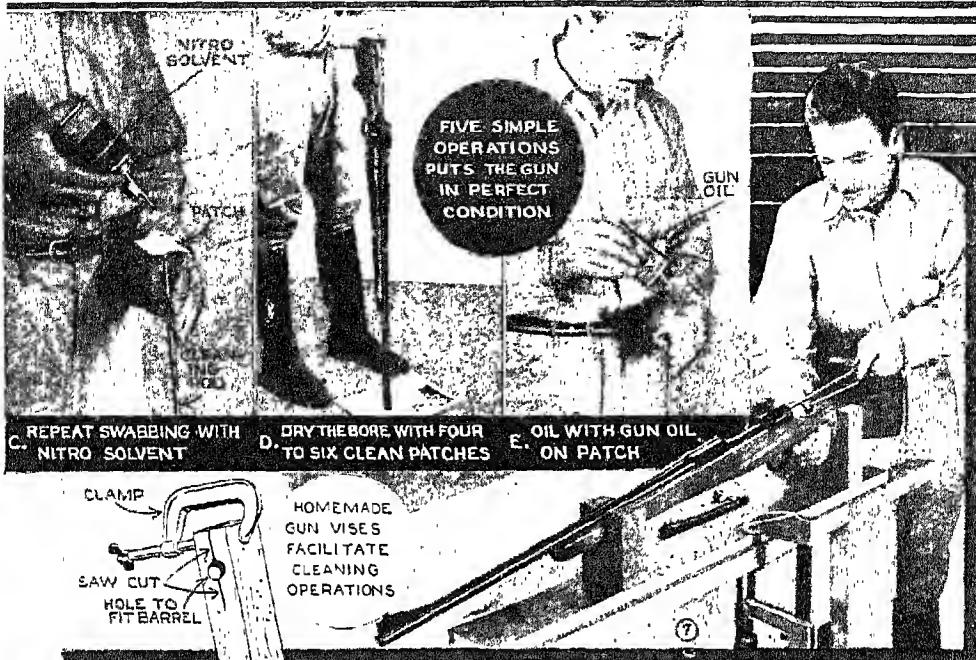
CLEAN GUNS



INCREASED accuracy, smoother shooting and longer gun life will reward the shooter who spends a little time in keeping his guns in first-class condition. Given a new gun to start with, a few minutes cleaning time will keep it in perfect condition whereas the neglected gun becomes increasingly difficult to clean satisfactorily.

Cleaning a rifle or shotgun involves five simple operations, as shown by the photos A to E inclusive. The bore is first swabbed with a flannel patch well saturated with nitro solvent. Cleaning should be done from the breech of the barrel if possible, and the muzzle of the gun should rest on a clean magazine or a block of wood. The patch should be run up and down the bore several times to saturate the powder residue thoroughly with the solvent oil. Any brand of powder solvent available at a hardware store will do. Operation No. 2 calls for a brass brush. Running this up and down the bore will remove the sticky powder fouling partially loosened by the action of the solvent. The brush should be pushed out of the barrel on each down stroke. Reversing the direction of the brush inside the bore does nothing but ruin the brush. Next repeat the first operation. The object of the fourth operation is to dry the barrel thoroughly. Start by wiping the rod clean. You will need four to six clean patches. Run the first patch down, up, down and out at the muzzle end. Run the rest of the patches through the bore once only, discarding each at the muzzle end. The final patch should

for GOOD SHOOTING



show perfectly clean and dry. If it shows dirt, the preceding operations must be repeated. The final operation is oiling. This is done with a clean patch. Use any good gun oil. This will protect the gun for a period of four to eight weeks. If the gun is to be stored for a longer period than this, use gun grease instead of the lighter oil.

As previously mentioned, cleaning should be done from the breech. Cleaning the gun

from the muzzle permits the rod to rub at this vital point, causing wear which may influence the accuracy of the weapon. Some guns cannot be cleaned from the breech. In this case it is advisable to use a wooden or brass muzzle cap, Figs. 2 and 3, to protect the muzzle. If you use a plain jag tip for cleaning, the chamber should be fitted with a cartridge case plugged with wood. This will prevent the patch from working loose as it sometimes does when pushed into the larger diameter of the chamber.

Fig. 1 shows the five types of cleaning tips commonly used. The single slotted tip is the simplest. It has the advantage of holding onto the patch under all conditions, but has two disadvantages in that the patch sometimes jams when reversed inside the bore, and, the cleaning action is often one-sided, permitting the bare sides of the tip to rub the bore. The plain jag tip gives a uniform cleaning action, and reverses perfectly inside the barrel. The patch sticks to the tip as long as it is inside the barrel, but any chance movement beyond the muzzle or chamber will cause



it to come loose. The same applies to the jag tip with point. The point is an advantage in centering the patch previous to insertion in the bore. The double-slotted tip is a first-rate cleaner, with a uniform action. The roll jag permits rolled or wrapped patches, and is preferred by many shooters on this account. The patch is wrapped around the jag as shown in Fig. 6, and can be made tight or loose as desired. Fig. 5 shows how the plain jag is used, the patch simply being centered on the tip, while Fig. 4 shows the obvious way of using either the single or double-slotted tip.

The cleaning rod itself can be brass or steel and should be of a proper diameter to fit the bore of the rifle. It must be fitted with a swivel joint so that the patch will

rotate inside the bore, following the rotation of the rifling. Without this rotation, the patch will drag at right angles across the lands and will quickly destroy the sharp edges of the rifling. The patch should be of such a size as to require three or four pounds pressure to force it through the bore of the rifle. A shotgun cleaning rod does not require a swivel joint, as this weapon has a smooth bore. Other than this variation, the cleaning technique is exactly the same, with the exception that most shooters prefer a wire-gauze cleaner or a brass worm instead of a brass brush.

The cleaning operation as described can be simplified greatly if some type of vise is made to hold the gun. Rifles are easily held in a simple jig consisting of two wooden chocks nailed to a baseboard, Fig. 7. Shotguns can be clamped in the jig shown in Fig. 8. Clamping in a standard wood vise is also satisfactory, but care should be exercised in exerting too much clamping pressure.

Other than powder fouling, the shooter must sometimes give consideration to metal fouling. This is a deposit of metal left by the bullet in the bore. If you shoot lead bullets, the fouling is more specifically designated as "leading." It is obvious that a perfectly smooth, polished bore will pick up very little metal fouling, whereas the roughened, neglected bore will always foul to a greater extent. Metal fouling in itself does no particular harm to the bore, but it may trap powder residue beneath it, leading to corrosion of the bore. Metal fouling can be detected by a careful examination of the bore, in which the fouling will show as long streaks, flaky deposits or even ac-

tual lumps of metal sticking to the lands and grooves. The fouling is easily removed, if attended to promptly, by using the metal-fouling solution specified in Fig. 11. The liquid is kept in a tightly corked bottle at all times except when actually using the solution, since it loses strength quickly when exposed to air. This can be applied with a cloth patch in the usual manner if the deposit is light. For a more thorough action, the solution is poured into the bore of the gun after first plugging the chamber with a rubber cork. When first poured in, the solution will be as colorless as water but will assume a deep blue color as it begins to dissolve the metallic deposit. The action is complete in about 15 min. Care should be taken in using the metal-fouling solution as it will remove bluing or the finish on the stock. After the solution has been removed from the barrel, the regular cleaning procedure should follow immediately.

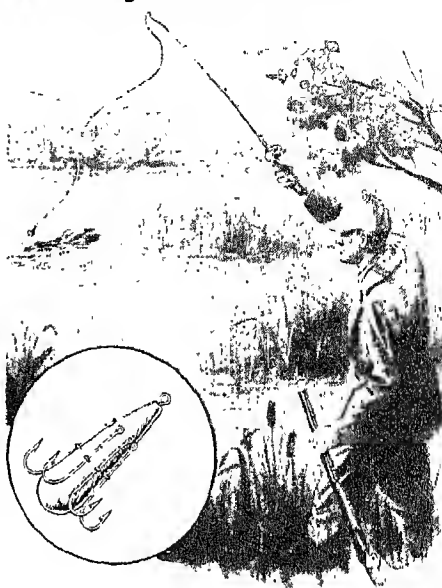
Leading can be removed with the metal-fouling solution. Many shooters, however, prefer mercury. A few ounces of this are placed in the barrel. A finger over the muzzle will hold it inside, and a few tips up and down will cause the mercury to amalgamate with the lead deposit. The solution can be used many times. Mercurial ointment is a satisfactory remedy for leading as is also common vinegar or a dilute solution of glacial acetic acid.

Metal fouling in shotgun barrels or any condition of rusting or pitting can be removed usually by mechanical methods as the smooth bore permits almost any type of polishing. The cleaning operation is most conveniently done in a lathe, mounting the polishing barrel or abrasive in the lathe and holding the gun barrel in the hands, as shown in Fig. 9. Steel brushes and polishing heads for this purpose can be purchased, or the shooter can make his own, as in Fig. 10, to be used with paste abrasive, steel wool or abrasive paper.

Game Hooked to Hunter's Belt

Ordinary shower-curtain hooks, with one end sharpened, are handy for carrying birds, rabbits and other small game. With the hook slipped through your belt loop, the sharpened end holds the game without danger of losing it. Some hunters consider this method superior to the use of game pockets in a hunting coat.

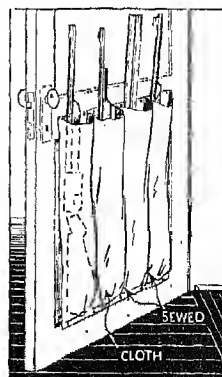
Fowl Are Retrieved From Water With Snag-Hook and Rod



To avoid rowing or wading in small ponds, streams and lake to retrieve ducks or other fowl shot from the shore, a hunter carries a rod and reel with which he casts a special floating snag-hook. This consists of a fishline bobber to which several hooks are attached with small staples as shown in the circle. When cast over the fowl or near it, the snag may be manipulated easily to catch and drag the bird to shore.

Cloth Rack for Guns Hangs On Back of Closet Door

Living in a small apartment where space was very limited, one housewife whose husband had several guns, saved space in the closet by making a cloth rack for the guns and hanging it on the back of the closet door. The rack was made by sewing two pieces of strong, heavy cloth together so that long pockets were formed.





TRAINING *Your* DOG



Left, running-noose collar helps teach dog to obey. Circle, right, Labrador retriever swimming in with duck. Circle, bottom, trainer and two retrievers, a Labrador and a spaniel

WITH a little effort you may teach your dog to be a useful hunting companion. Retrievers, pointers, setters, spaniels, and some other breeds have the instinct for bird hunting and sometimes a common "mutt" also makes a good hunting dog.

First comes a course in obedience. Your dog won't mind you in the field until he has learned obedience in the yard. From eight to twelve months of age is the best time to start, although an older dog can be taught if you take the time. The dog must be trained every day for half an hour. Keep the pupil cool by working him in the shade, away from distracting influences.

At the gun-dog training quarters of A. H. Asmus & Sons in Bellflower, Calif., bird dogs are taught to sit, to drop game on command, to drop and stay there, walk at your heels, whoa, come to voice or whistle, and retrieve. Ed Asmus, the trainer, says:

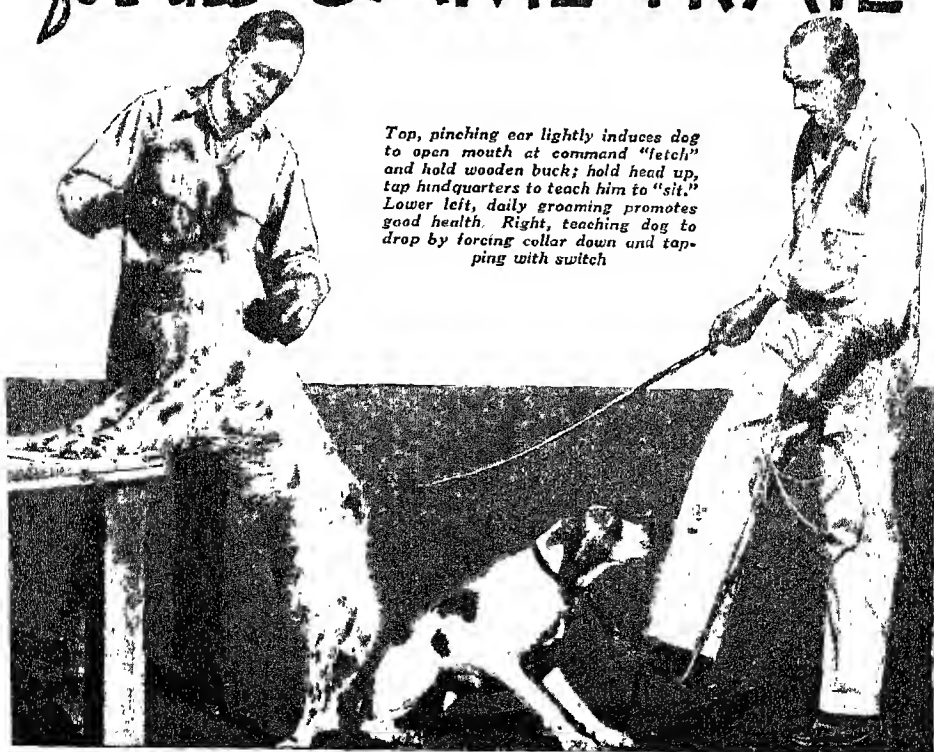
"Sternness and force are part of the training system, with praise and petting mixed in. If you lose your temper or are cruel you fail."

After the pup has learned his name and has become used to a collar and lead he

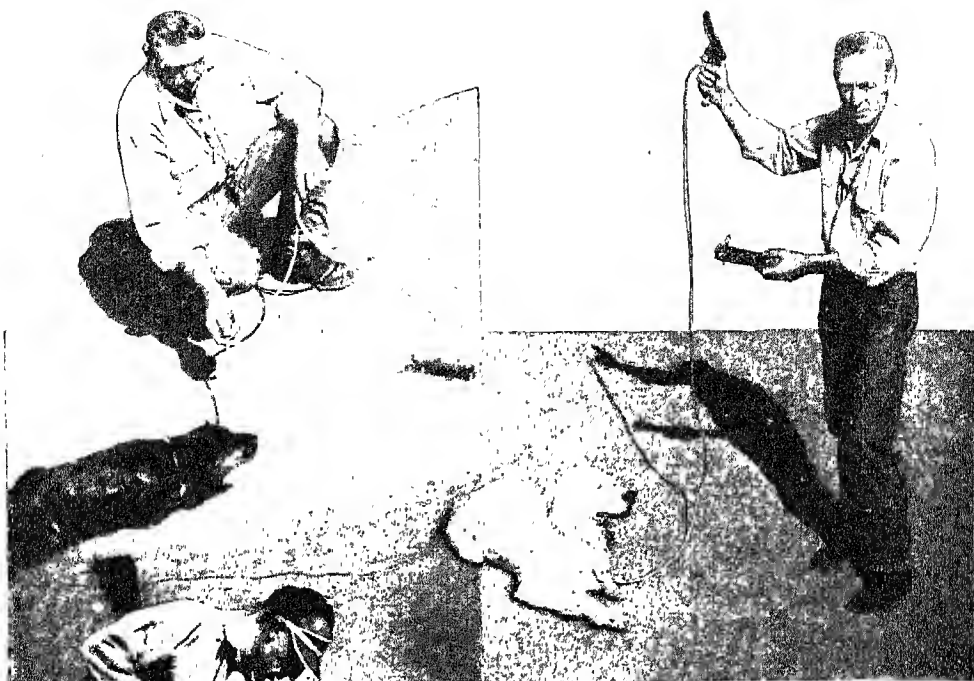
should be taught to heel. That means the dog is to stick close to your left or right side, a little behind you. Use a short lead and keep him in position as you walk around, tapping him on the nose with a switch when he runs forward and jerking him ahead if he drags back. Command him to "heel" every time he tries to get away. Within a week the dog should follow on a loose lead after you have called "heel." If an ordinary collar isn't enough to give him the idea after a few days, use a force collar of the running-noose type that tightens up on his neck and cuts his wind when he tries to get away. It won't hurt him. After several weeks you can drop the lead and let him drag it, then in another week remove it.



for the GAME TRAIL



Top, pinching ear lightly induces dog to open mouth at command "fetch," and hold wooden buck; hold head up, tap hindquarters to teach him to "sit." Lower left, daily grooming promotes good health. Right, teaching dog to drop by forcing collar down and tapping with switch



Left, early step in retrieving. Dog is "dropped" on ground and taught to pick up buck at command "fetch here." Right, tossing feathered buck. Trainer fires cap pistol after dog is executing "fetch here" to prevent gun shyness. Below, hunting dog is taught to sit and hold the game



While the dog is learning this, teach him also to sit. Command "sit" and hold his head up with the lead while tapping his hindquarters with a switch or pushing them down. Keep his head in the air if he tries to lie down. Next is "sit and stay there." Give the command, walk off a few feet, and if the dog follows, take him back and tell him again to "stay there." Eventually you should be able to go out of sight while the dog sits still.

At the command "drop" the dog should drop to the ground on all four feet. Start with the sitting position, command "drop," and force his head down with the lead, tapping his shoulders with the switch at the same time. Later on make him "drop and stay there" no matter what distractions there may be.

To teach the dog to come to you, use a short lead at the beginning. Call "come here to me" and use his name, pulling him to you at the same time. Later on graduate to a rope thirty feet long and bring him in with a sharp yank if he doesn't come promptly at command.

The dog should be taught also to come at a whistle; in the field he may range beyond your voice.

"The dog should be letter perfect in all these commands within six weeks or two months," says Asmus. "Always use the same commands. In the last stages of training nearly all dogs need the force collar to prove to them that you mean what you command. As they improve, drop the lead and let it trail and finally remove it, but go back to it if necessary."



To teach the dog to stop at the command "whoa," use the long lead and the force collar. Let him break to chase or to retrieve, and just before he hits the end of the rope, command "whoa." The sharp jerk may throw him to the ground, and it won't take many lessons for the command "whoa" to bring him to a stop. Later on you can improve this to "whoa drop" to make the dog drop in his tracks and lie still.

Retrieving is a special art. Many dogs are natural retrievers and pick it up through play, or by being worked with other dogs. Even these, Asmus declares, should be force trained. A natural retriever enjoys his work but does it the way he wishes. Training makes him work more surely.

"A six-inch length of broomstick makes a good object to start with in teaching the dog to hold," Asmus says. "Make him sit and hold the stick, called a buck, in his mouth. Command 'fetch' every time you put it in his mouth. Force him to hold it until you take it away with the command 'give.' After he learns to do this, hold the buck in your hand in front of his face, command 'fetch,' and

Left, dog is pulled in if he fails to come at whistle. Right, teaching dog to hold buck in mouth. Below, in teaching dog to "heel," use short lead to hold him in place and tap him back with switch if he runs ahead



pinch his ear. Pinching his ear or using some other kind of force makes him open his mouth and take the buck. When the dog learns to take the buck from your hand at command, you are ready for the next step. This time he is to take the buck from

hand while in a dropped position, and deliver it to you at the command 'fetch here.' Have the dog drop; face him and hold the buck out in front of him. Give the command 'fetch' as he takes the buck from hand, back up and command 'fetch here to me.' Pull on the lead to bring him to you if necessary. He should deliver it in a sitting position."

Next, put legs on the buck so that it stands off the ground and can be picked up easily by the dog. Two short metal rods through holes drilled at each end will do. Make the dog sit and hold it at the command "fetch." Then with the same command let him take it from your hand and finally from the ground in front of him. Then put it out of his reach so that he goes over and picks it up at the command "fetch here." Gradually extend the distance to several feet and finally have him retrieve from thirty or forty feet away, using the force collar if necessary.

"Use the lead on all this work and pull him in promptly as soon as he has picked up the buck," Asmus advises. "Don't hesitate to use the force collar firmly. The dog should be perfected in each step of this training program before he is advanced to the next and if trouble develops go back several steps and work forward again. It may take two months of diligent training before the dog is ready to hunt with you."

Next step is to use the feathered buck. Tie a covering of feathers firmly around the pronged buck. Start in at the beginning once more and repeat all the first steps. This may take only a day. Then have the dog drop, throw the buck a few feet away, command him to "fetch here" and fire a cap pistol as he reaches the buck. Later on you can fire the cap pistol before the command, and after that begin using a .22 for the louder noise; but at the start it is important not to allow the dog to become gun shy. If he seems particularly timid fire the cap pistol at odd times while he is occupied and then pet him to show him that the noise is harmless.

At this stage, begin steadying the dog to command. He should always be under control and not permitted to retrieve the buck until commanded to do so. A dog that rushes in as soon as a shot is fired or a bird falls may flush up other birds and prevent you from getting them. Drop the dog and restrain him with a force collar, throw the buck, and steady him until you

finally command him to fetch it in.

Next step is to use a dead bird in the yard instead of the feathered buck. Repeat all the exercises with the bird and later take the dog out into a field and have him retrieve the bird from short distances. Then toss the bird into brush or behind bushes so that the dog has to use his nose to find it. Perfectly trained, he will quarter back and forth until he scents it, pick it up and bring it in, and sit in front of you until you take the bird from his mouth. Now you can start to hunt with your dog.

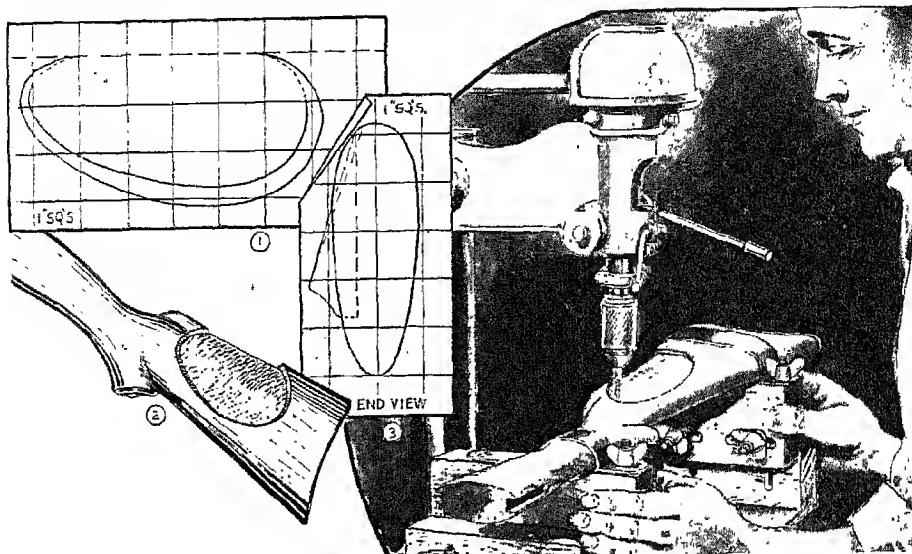
"Teaching a dog to retrieve takes time and patience and a thorough understanding of the force method," Asmus says. "Each dog is different but these basic rules should be followed in general. Once training is started, follow it through. Never give a command and then not enforce it. The dog may get the idea he doesn't need to mind you."

Daily grooming promotes health and well-being in all dogs. Brush your dog's coat with a heavy bristle brush and on long-haired dogs use a metal comb, wipe out his eyes with cotton dipped in a saturated solution of boric acid, dust dry boric acid powder down into his ears to prevent canker, and smear his nose with a little vaseline to keep it soft. All this should be done daily.

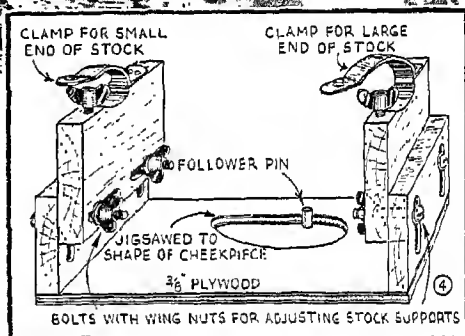
Don't overfeed a hunting dog. He should be lean and hard and if short-haired his ribs should show. Feed him the night before and not on the morning of a hunt. Carry water and offer him a drink every half hour in dry country. Brush up his training for several weeks before you hunt with him. If the dog has been lying around most of the summer he needs to be conditioned, exercised, before he is hunted. Otherwise he may get sore feet, overheat, and wear himself out. If you are to use the dog more than half a day, bring him to heel once in a while to rest him and give him a good rest at noon.

As a general thing any medicine given the dog should be mixed with its food. If that is impossible, place it as far back on the tongue as possible and close the jaws for an instant. This causes the dog to swallow the dose involuntarily. Usually, it is easy to teach dogs to take the medicine. Act firmly and under no circumstances permit the dog to avoid the dose. A large dog may be backed into a corner for ease in handling.

Inlaying a Cheek Piece in Your Own Gunstock



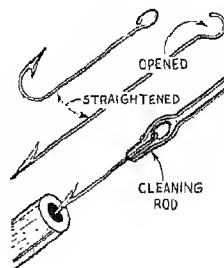
Although many sporting rifles have cheek pieces on the stocks, most shotguns, except the highest priced ones, do not. However, any shotgun owner can make one for his stock. First, the stock must be routed out to form a cavity in which the piece is inlayed. A router bit in a drill press is ideal for this work. You will need a clamping jig like the one shown in Fig. 4 to hold the stock. Notice that the ends of the jig are adjustable in height so that the stock can be held level horizontally under the router bit. Also notice that the base of the jig is cut out exactly to the shape of the cheek-piece cavity to be routed in the stock. A pattern of this opening is given in the squared diagram of Fig. 1. The white portion indicates the amount of bevel on the edges of the cheek and has nothing to do with the shape of the opening. Just make this to the size and shape of the outside line of the pattern. In use, a pin is put in the drill-press table, and the jig is moved around to outline the cavity on the gun stock, keeping the edge of the opening in the jig against the pin. When the routing has been finished, make the cheek piece and inlay it in the cavity. Fig. 2 shows how the cavity appears on the average stock. The cheek piece is saved to shape from 1-in. walnut, matching the stock as closely as possible in color and grain. Then it is glued in place, allowing

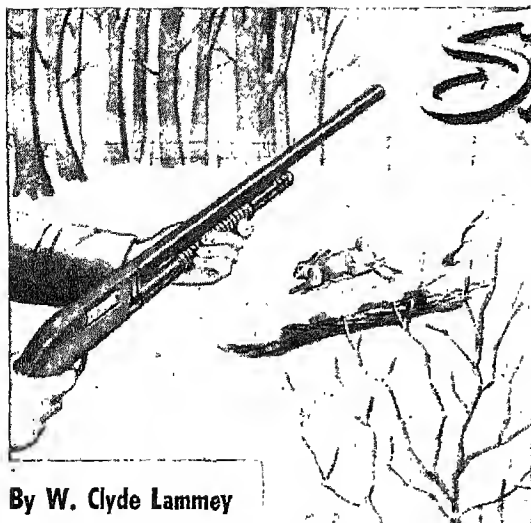


plenty of time to dry. After this, final shaping of the piece is done with a rasp, file and sandpaper, testing it frequently for fit. A general cross section of the piece in place is given in Fig. 3. The job is completed by finishing the work to match the stock.

Fishhook Removes Cleaning Swab From Rifle Barrel

To pull a cleaning swab from a rifle, straighten a fishhook and attach it to a cleaning rod as shown. When inserted in the rifle barrel, the barb will snag the swab so it may be pulled out easily.





Shotguns

By W. Clyde Lamme

WHEN quail rise from nearby thickets and streak away through the low cover, or a cock pheasant blasts unexpectedly into the air from a spot almost under your feet, you'll find it easy to agree with those experienced shooters who have called shotgun pointing a sport of "controlled relaxation." That's just what it takes—a delicately controlled coordination of feet, legs,

shoulders, arms, hands, head, eyes and senses. Each mental and physical process must be assigned a definite place in a smooth continuity of motion, all to the end of accomplishing several specific things in a split second of time. Like other outdoor games requiring a high development of skill and dexterity, it calls for a lot of practice. When flushed birds are winging away at mile-a-minute speeds there's no time to take into deliberate account all the variables offered by each shot. Essentially the problem is simple—mainly that of intercepting one moving body, the target, with another, the shot charge. But suppose you are standing in the open and, without warning, a flying target suddenly appears, moving across in front of you from left to right at a speed of say 88 feet per second, or about 60 miles per hour. Some game birds fly even faster. How to place a shot charge at just the proper distance and posi-



① Beginning of the gun swing in firing at a target crossing in front at right angles from left to right. Note that the shooter first swings left to pick up the target, using the gun as a "pointer"



② Here the shooter starts the reverse swing, the pivot to the right continuing until after the shot is fired so that speed of gun swing will not diminish. Note that feet remain in the same position

Footwork

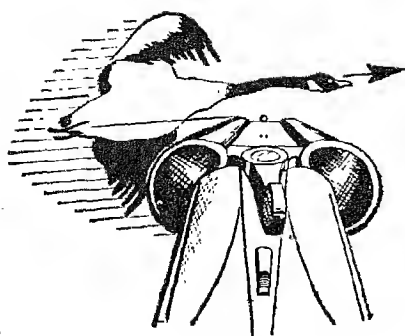
tion in the sky ahead of this speeding target to catch it when it comes along—that's the trick.

It begins with footwork. If a shooter is caught off balance at the instant his target is trapped, or has the wrong foot forward when a bird flushes in the field, he's almost sure to miss, unless he's practiced approved methods of getting quickly into shooting position. Many grouse hunters move through likely cover with a short, halting step and gun held in both hands. Experienced quail shooters, moving in for the flush behind dogs holding rock-steady on point, do much the same. Each must have his feet "under him," ready for quick,

controlled action when the birds take off.

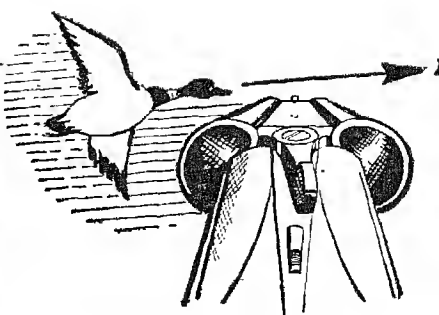
If all the variables of any given shot are calculated mathematically and the necessary impulses and body movements are considered separately, the thing can be made to appear impossible. But the answer to that one is that a single mental process can be trained to control several physical reactions which may be required to produce a definite result, just as in driving a car or playing golf or tennis. At the outset the shotgun pointer acquires the habit of "facing the shot." If he's a right-handed shooter he comes to think of the right leg as the balance or "steering" leg. His left leg becomes the "pivot" leg. In





3

SWINGING PAST



POINTING OUT

trap, skeet and upland game shooting the feet normally are kept quite close together. Irregularities in posture, such as feet spread wide apart, bent knees, or body bent far forward, destroy the muscular torsion and body balance so necessary to a quick, rhythmic swing to right or left. In facing the shot the left toe usually points slightly to the right of the spot where it is expected the shot charge will be delivered. The feet are separated at an angle, the right foot normally a few inches back of the left. Nearly everyone can take this position, raise, or mount, the gun and swing it right or left through a combined angle of 60 degrees or so without experiencing undue muscular tension or discomfort and without lifting either heel from the ground. In this position most of the weight will be on the left foot. When a swing is made in either direction, muscles of the feet and legs will be placed under a torsional strain which increases progressively until the extremes are reached. The gun muzzle is lowered to follow running game by bending the body forward at the hips, raised by a slight backward bend and swung right or left by pivoting, not swaying. Arms, head,

torso and gun move as a unit, except that in a swing from left to right, right-handed shooters may find it necessary to slide the cheek along the comb of the gunstock. In depressing the muzzle the left leg takes more of the weight, while in elevating the gun the right takes the greater share. However, in a good shooting position the transfer of weight is hardly noticeable.

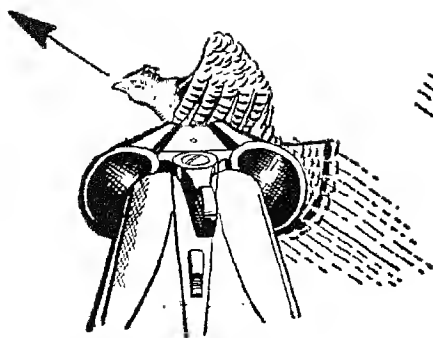
Body and foot positions in Figs. 1 and 2, A to F inclusive, show in a way how the whole procedure works out in practice. The broken line shows the approximate position of the gun in relation to the foot position. Some good shotguns stand with the feet even closer together than indicated, while others, especially skeet shooters, find it more to their advantage to stand with the feet somewhat farther apart. There are no hard-and-fast rules but in any case when facing the shot the feet are the foundation from which the gun swing is made and both should be firmly on the ground during the whole maneuver.

Watch a top-rate wingshot take the four pairs of doubles in a round of skeet, where the traps are sprung simultaneously, and the shots usually are taken from stations

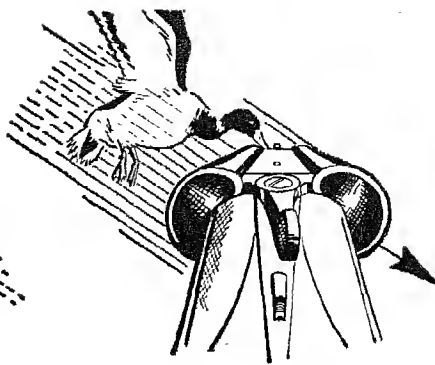


4

This shotgunner is taking a surprise target flying away sharply to the right. He must withdraw the right foot, pivot on the toe and step in the direction of the flying target with the left foot



RISING TARGET



FALLING TARGET

5

1, 2, 6 and 7. In the ready position the shooter faces the shot on the near side of the spot where the targets will cross in flight. In this way he has his feet already placed in the best position to swing on the second bird. He takes the outgoing target first, then swings for the incomer from the same foot position. Also, if you observe closely you will see that the gun swing doesn't start at the precise instant the targets are trapped, but that the shooter holds for the briefest moment until the targets are in clear view. Then, like the golfer, he must have perfectly controlled coordination, but he must move a lot faster.

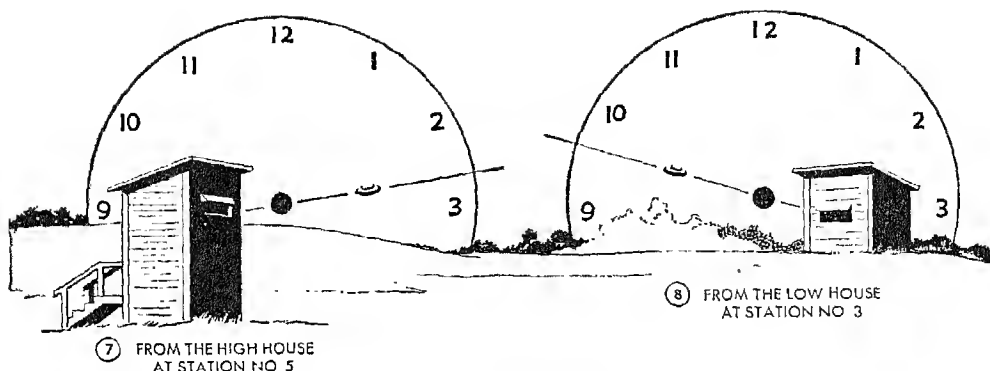
In this demonstration two things take place that you don't see. In order to estimate instantly the apparent speed and direction of the swiftly moving targets, the shooter very likely is using the imaginary vertical clock system, Figs. 7 and 8, and, to bring the gun to bear on the flying clay birds before they get out of bounds, he must cut his timing pretty thin. There's no time to swing the gun in front of each individual bird and maintain a measured lead. So the shooter uses a trick effective at the shorter ranges and known to shotgun

pointers as the fast swing or "swinging-past" method, Fig. 3. In this the gun muzzle follows the line of the target's flight in a fast swing, overtakes it from behind and swings past. As the gun muzzle passes the target the shooter pulls the trigger, and the gun, swinging faster than the bird, builds up the required lead. The essential thing is that the gun be moving uniformly. Any irregularity in the swing, such as finching or stopping the swing at the instant the trigger is pulled, likely will cause a miss. Speed of the swing is important, too. For example, the speed of the swing in a crossing shot must vary from that employed in a quartering shot. Practice of the fast-swing method usually is to be recommended only for the shorter ranges where flight of the targets is uniform and predetermined, such as in skeet or certain shotgun games and also in upland game shooting where the nature of the cover and the character of the bird's flight call for quick work at close range. Some wild-fowl hunters using high-speed ammunition use the fast swing at medium-long ranges. On the other hand, at the traps, pass shooting, or along game-bird flightways where the



6

Caught out of position with the right foot forward and the target flying to the right rear, the shooter throws his weight on the right leg, pivots and swings the left foot to face the target



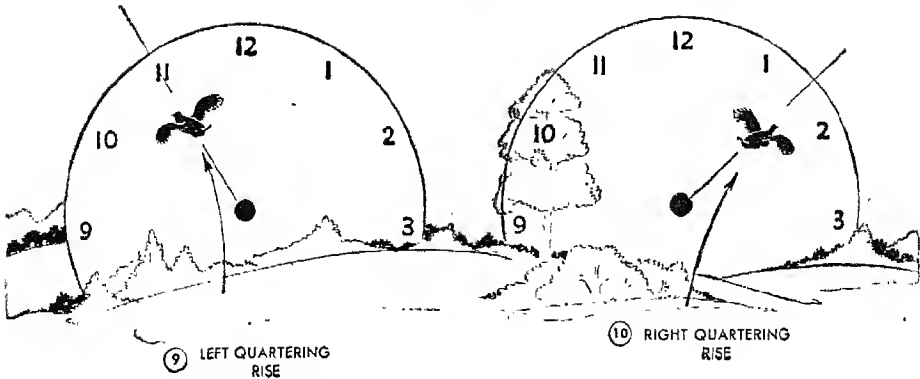
shots are taken at comparatively long ranges, good shooters generally use what is known as the slow swing or "pointing-out" method, Fig. 3. This involves a more precise calculation of distance, apparent speed of flight and gun swing. Actually the eye controls the whole procedure. Here the gun is swung ahead of the bird and a measured lead maintained until after the shot is fired. In this the apparent speed of the target is important. A target crossing in front of you at right angles and another quartering away either right or left may be moving at the same rate of speed but the quartering target will appear to be moving much slower. This is due to perspective, or obliquity of the line of flight to the eye. Because of this apparent reduction in speed the forward allowance or lead will need to be reduced accordingly. All this assumes that the target is maintaining a more or less level flight. Sharply rising or falling targets, Fig. 5, introduce another factor. You have to lead a rising bird above as well as ahead. To connect with a falling target you have to get well under it. Figs. 3 and 5 are merely approximations. The sketches do not represent actual leads.

Most right-handed shooters find it easier to swing on a target crossing from right to left than on one from left to right. Often it will take considerable practice with the gun before one can accomplish the maneuver with equal facility in either direction. If you're a right-handed shooter, it's a good idea to practice the left-to-right swing shown in Figs. 1 and 2, details A to F inclusive. This can be done anywhere there is room to swing the unloaded gun. Keep the feet in the same position during the whole maneuver. Such practice, "dry shooting" as it often is called, is a valuable aid in mastering the finer points of gun swing and coordinated footwork. Left-handed shooters will find it extremely helpful to practice

a right-to-left swing in the same manner.

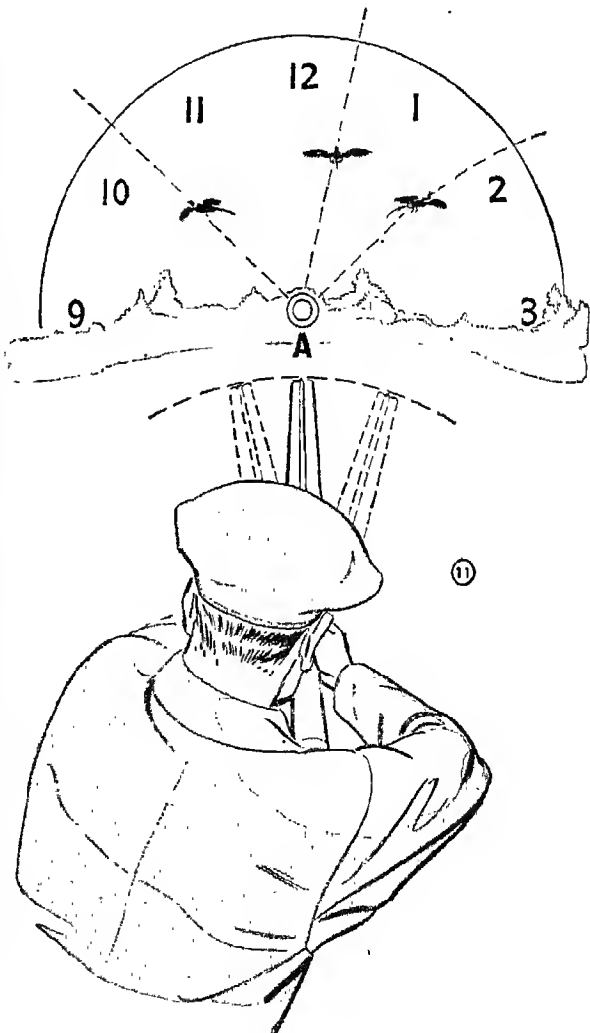
Fig. 4 illustrates a surprise situation where the shooter is moving through cover in the field. As the bird flushes and makes away well to the right and toward the right rear, the shooter's left foot is forward as at A. He must shift the right foot, pivot on the right toe and step in the direction of the flying target with the left foot as at B. Then by a third movement he comes to the position shown at C with the gun raised to point out the bird. Note that in this maneuver swinging and mounting of the gun and the footwork are done simultaneously. Fig. 6, A, B and C, shows much the same thing as Fig. 4, with one important variation. In this case, the shooter is taking a surprise shot to the right while advancing at a normal pace but caught out of position with the right foot forward when the bird gets up. The shooter finishes the step as at B, then pivots on the right foot and brings the left foot into position as at C. The foot positions in Fig. 6, C, have purposely been shown slightly incorrect to illustrate what often takes place. In making a quick pivot of this nature the tendency is to place the feet directly opposite whereas the left foot should be farther forward for good balance. Some practice may be necessary to correct this tendency. The maneuvers shown in Figs. 4 and 6 are among the most difficult foot movements for the upland gunner on uneven ground, or at the various "walk-up" gun games where the shooter must fire at surprise targets thrown at unknown angles. Practicing these foot movements for surprise shots from both the right and left will be a help in field shooting.

Use of the imaginary vertical clock face in applying method to the business of pointing a shotgun is quite simple in both theory and practice. In skeet or trap shooting the clock-face zero, represented by the

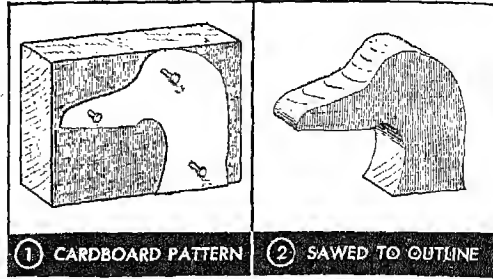


solid black circles in Figs. 7 and 8, will be the point in space near the trap house where you expect the target to appear in clear view. Once the target is sighted clearly, it's easy to think of it as a "2-o'clock" shot, a "2:30-o'clock" shot or a "9:30-o'clock" shot, depending on where the apparent line of flight will cut the circle of the imaginary clock face. When you face the shot at that point where you expect the target to appear, it takes only a comparatively short swing to put the gun on either a 10-o'clock or a 2-o'clock bird. This will be more clearly seen from Fig. 11, the zero point A representing the point at which the bird was first sighted. In upland shooting at birds which rise from cover, the zero point of the clock face can be thought of as being only in the vicinity of the spot where the bird was first sighted, as in Figs. 9 and 10. If you accustom yourself to its use, the clock face will form in your imagination the instant you recognize the flushing bird as a legitimate target.

In the 11:30-o'clock or 12:30-o'clock shot, Fig. 11, the lead and swing are reduced almost to zero, gun movement merely compensating for the rise of the target. In addition to footwork the shooter should consider stock length, drop, pitch and barrel boring to suit his purpose.



MAKE YOUR



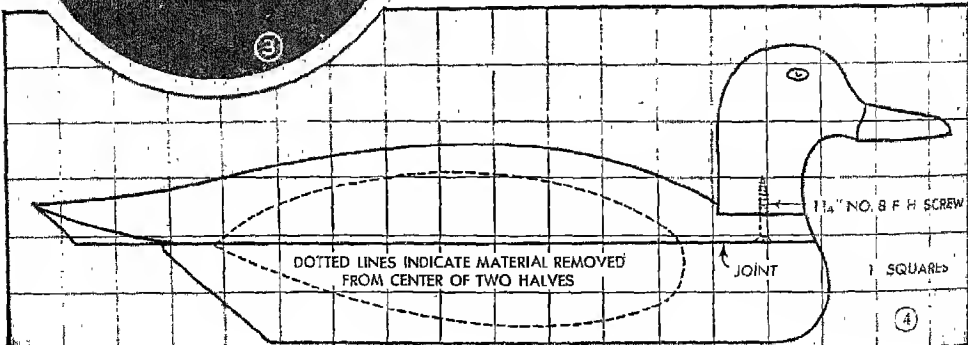
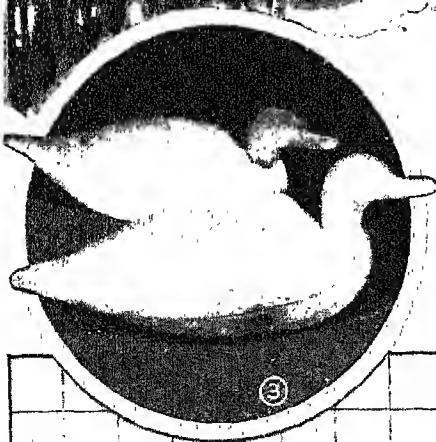
① CARDBOARD PATTERN

② SAWED TO OUTLINE

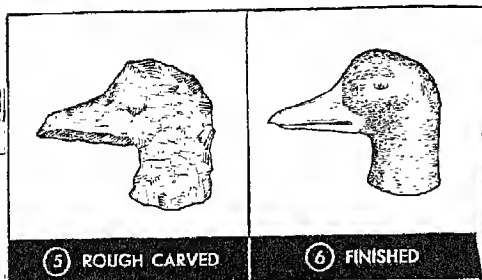
By W. C. Lammey

MAKING wood duck decoys is just another of those craft jobs which may seem difficult, but actually are very easy to do. Likely the most difficult part is carving the head, but if you cut and shape it separately and then attach it to the body, the work will be easier and you will have a better job.

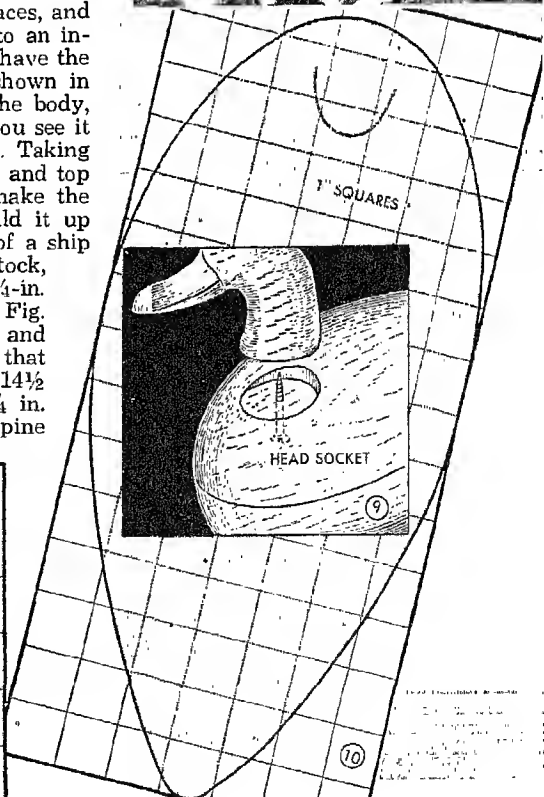
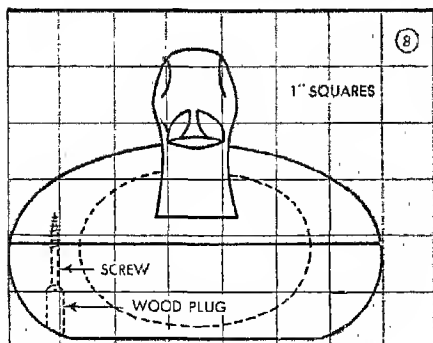
Figs. 1 and 2 show the first steps. The pattern is drawn from Fig. 4 by laying off the profile of the head full size on heavy cardboard or $\frac{1}{4}$ -in. wood. Then, after sawing out the pattern, tack it to a white-pine block 5 in. long, $1\frac{3}{4}$ in. thick and 3 in. wide. A similar length of ordinary 2 by 4-in. stock is just the right thickness and width. Don't use any pieces that are knotty, cross-grained, or full of pitch. Band-saw the head to the shape shown in Fig. 2 or remove the waste in straight cuts with a handsaw. Now, after sharpening a small blade of your pocket knife to a razor-keen edge you're ready for the carving, Fig. 12. Start the cut at the edge of the wood. You will see that by starting on the original edge anywhere and making a cut you produce two other edges which in turn are cut

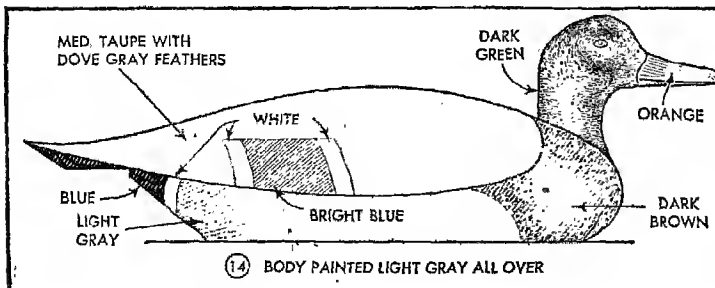
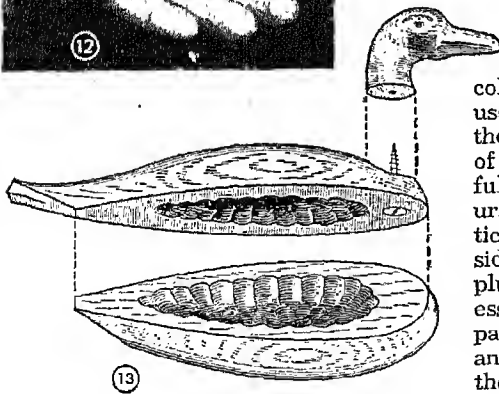
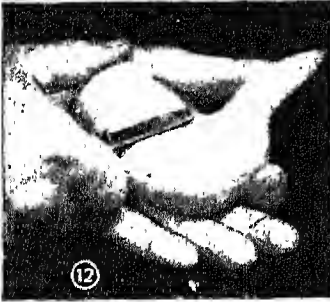


OWN DECOYS



down. That's the trick in carving such a shape as this. Be careful to prevent splitting at the top of the head and along the bill where the grain is straight. Make short, scalloped cuts to avoid lifting long chips. At the upper curve of the neck near the back of the head, and under the head in front, the job may be a little difficult. Merely bring these areas to a rough round shape and leave the rest to the wood rasp. After you have rounded over the corners until the curves meet at the center of the flat surfaces, and have trimmed the top of the bill to an inverted, flattened V-shape you will have the head rough carved to the stage shown in Fig. 5. Now, you start work on the body, since the head can be finished as you see it in Fig. 6 only after the body is made. Taking Figs. 4, 8 and 10 as the side, front and top views of the contours, you can make the body in either of two ways: Build it up "sandwich" fashion like the hull of a ship model from a number of pieces of stock, or make it from two pieces of $1\frac{3}{4}$ -in. stock with a hollowed center as in Fig. 13. The latter method is the best and quickest. Note from Figs. 4 and 8 that there are two pieces, the top one $14\frac{1}{2}$ in. long and the lower about $12\frac{1}{4}$ in. long. Ordinary 2 by 8-in. selected pine

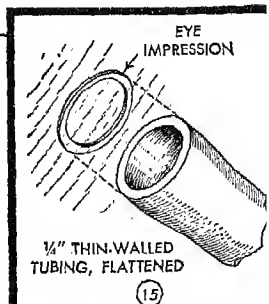




or fir stock is just right. Both top and bottom pieces are sawed to the shape shown in Fig. 10 except, of course, the lower piece is shorter, and one end is cut at an angle as in Fig. 4. Dotted lines in Figs. 4 and 8 indicate approximately the amount of waste to be removed from the halves. This is done with a gouge as in Fig. 7. If desired, you can make cardboard templates from Figs. 4 and 8 to aid in shaping the body curves. The whole job amounts to little more than rounding the curved edges with a spoke shave as in Fig. 11, but here's a point to remember: If you are making a number of decoys, Fig. 3, it's a good idea to bring them all to a finished stage, make a trial assembly of each, and then weigh them individually. In this way you can disassemble and trim out more waste from the centers to bring them all to a uniform weight. This is quite important in the full-bodied decoy.

The head is attached with a single screw as in Figs. 4 and 16, but before attaching, a socket must be formed for the neck, as indicated in Fig. 9. Be sure that the head is no higher in relation to the body than indicated in Fig. 4 as a head raised high is an attitude of alarm in live birds. Once the head is attached, assemble and finish the body surfaces with a wood rasp. Then disassemble, coat the joints with waterproof resin glue, drive home the body screws and fill the holes with plugs as in Fig. 8. No need to sand the surfaces; it is better to leave them rough in the "rasp" finish. Figs. 15 and 19 show one quick method of making a passable eye. Ready-made glass eyes can be used if desired. Practically speaking, the eyes are not at all essential.

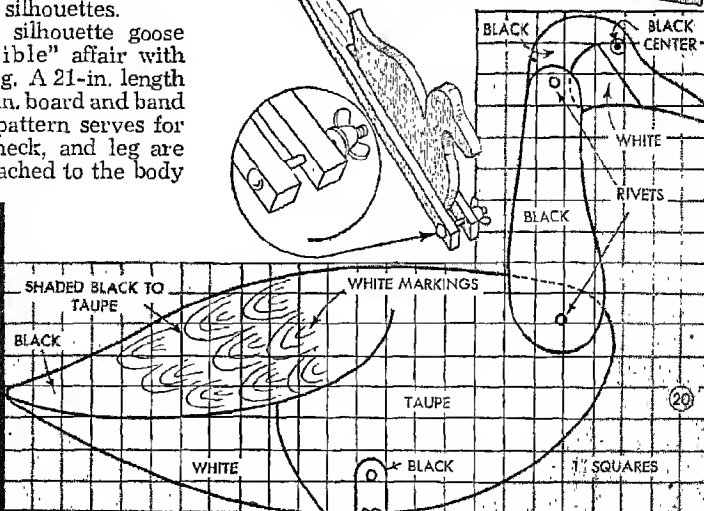
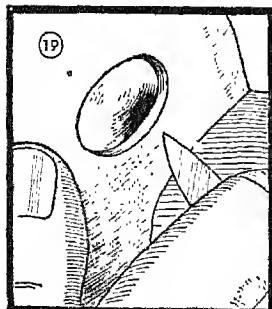
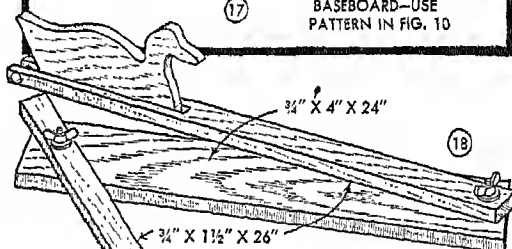
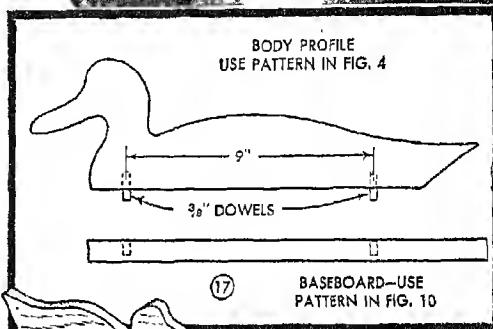
Fig. 14 gives a fairly simple color key for painting the body in simulation of a mallard drake. A good job will take time and care. If available, use japan colors over the gray ground coat. Otherwise use ordinary outside oil paints and, when these are thoroughly dry, finish with a coat of flat varnish to dull the gloss. If done carefully, this procedure results in a very natural appearing job. However, many practical and experienced wildfowl hunters consider the attempt to simulate the natural plumage colors in intricate detail as unnecessary. They prefer that their decoys be painted only in monotone variations of gray and brown, which makes it possible to use the same decoys on a number of the common

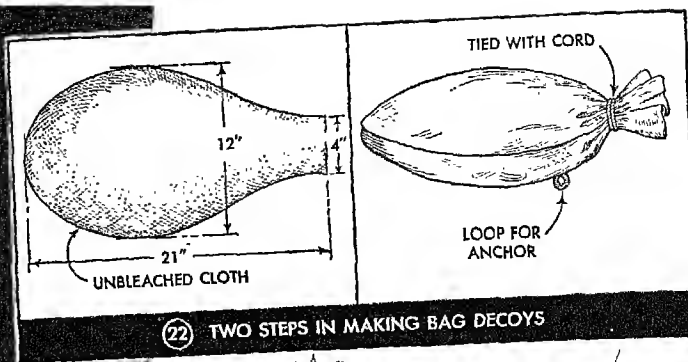


species. For this purpose the head and neck can be colored a dark green and the breast a brown which is blended into a medium gray for the balance of the body. The simulation of wing feathers is made with a lighter gray. When you blend the wet paint colors, Fig. 21, keep the excess wiped from the brush with a cloth. This particular decoy is really a "composite" simulation, larger than some common species, somewhat smaller than others, but experiment has shown it to be effective, durable, and most important, it rides rough water well. To finish, turn a small screw eye into the bottom about 4 in. back of the breast curve to provide for attaching an anchor.

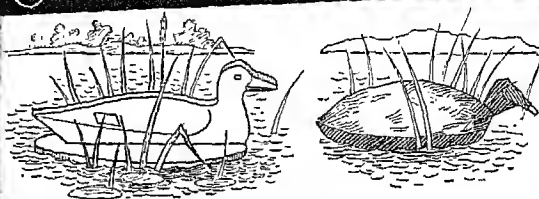
Profile or silhouette decoys are simple to make. They are effective lures and have the advantage of being light and easy to transport and set out. Figs. 17 and 23 show one type of silhouette which is loose-doweled to a base or float. To make the body, lay off a pattern, less $\frac{1}{2}$ in. from the height, from Fig. 4, and for the base a pattern from Fig. 10. Transfer out-lines to $\frac{3}{4}$ -in. stock and saw in the usual way. Some makers use $1\frac{1}{2}$ -in. stock for the base. Dowels are glued in only one of the members so that the parts can be separated and carried flat. Fig. 18 shows another version, a folding affair which is exceptionally handy. Slots are cut in one end of each arm to take silhouettes band or scrollsawed from $\frac{3}{4}$ -in. stock. Again use the profile in Fig. 4, but add about $\frac{1}{2}$ in. to the height of the body. Use $2\frac{1}{4}$ -in. bolts with wing nuts to provide adjustment in the arms and hold the silhouettes.

Next comes the silhouette goose decoy, a "collapsible" affair with folding head and leg. A 21-in. length cut from a $\frac{3}{4}$ by 8-in. board and band or scrollsawed to pattern serves for the body. Head, neck, and leg are separate pieces attached to the body





(22) TWO STEPS IN MAKING BAG DECOYS



(23) SILHOUETTE DECOY

(24) BAG DECOY

with rivets. Use $\frac{1}{2}$ -in. stock for these parts. Colored areas are indicated in Fig. 20. The silhouette duck decoys, Figs. 17 and 18, are best painted a medium gray all over with a green head and brown breast, the latter color blended into the gray. To make representative eyes on both the duck and goose silhouettes, first paint a small area an orange color where the eye is to be. When dry, draw a $\frac{3}{16}$ -in. circle with India ink. Bring the head color up to the inked line and paint a black center as indicated in Fig. 20. The eye on the goose decoy is somewhat larger. Both are "conventional" eyes but they will serve the purpose. Remember, if you use oil paints for either of these jobs, to finish with a coat of flat varnish to kill the gloss.

Last comes the bag decoy and that's literally what it is. A crude affair to be sure, but very effective; in fact it is quite widely used by experienced hunters. To make it, cut two pieces from unbleached cotton cloth (some use light canvas) to the size indicated in Fig. 22. These are sewed together with a double seam, then reversed, and the resulting bag stuffed, the open end being tied with a stout cord. Sew a loop to the underside for attaching an anchor. Ordinarily, the material known as kapok is best for filling, but lacking this, cedar shavings or upholsterers' curled hair will do. Most of the materials used for treating canvas may be used for waterproofing the cloth. Two coats of linseed oil will serve nicely for this purpose. Coloring the

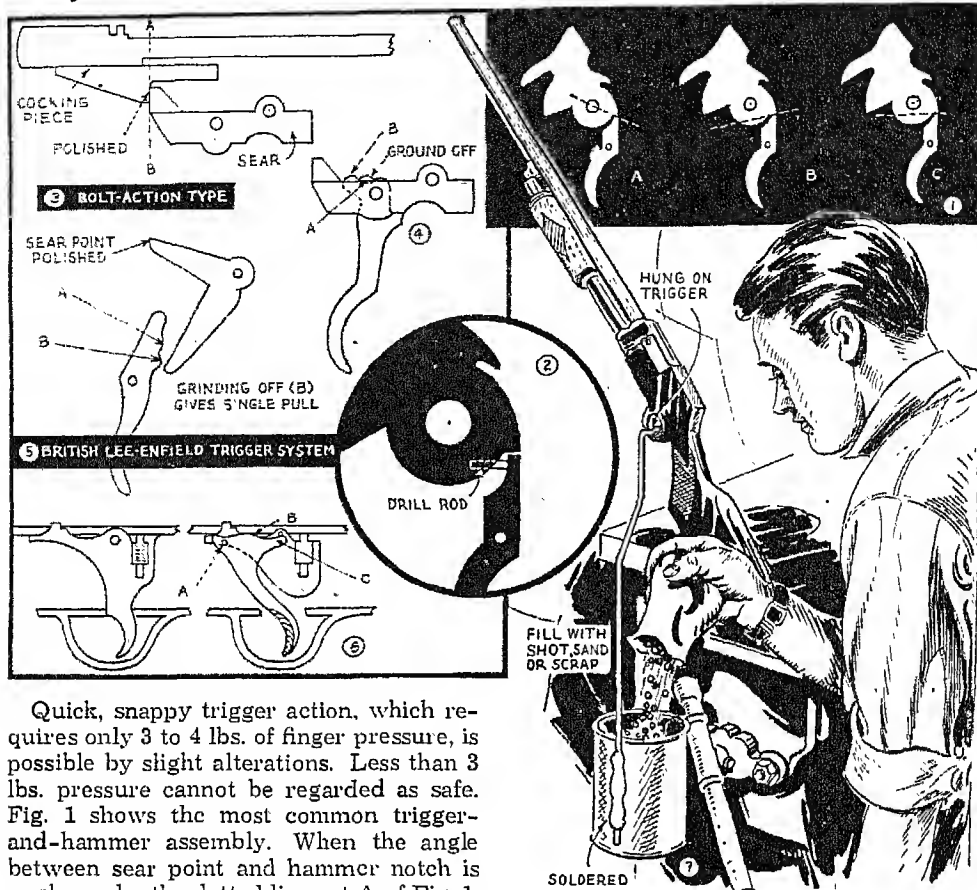
cloth body can be done in the same way as described for the full-bodied wood decoy, using oil paints or japan colors. With a spring clothespin for a bill, Fig. 24 shows about what you get, unimpressive perhaps in a close-up, but from a "duck's eye" view quite effective.

Duck Decoys Are Easy to Carry In an Old Inner Tube



An old inner tube having slits cut along one side as indicated provides a handy carrier for duck decoys. It can be slung over the shoulder to leave both hands free and it also prevents the decoys from becoming scratched or otherwise marred. From six to eight decoys can be carried in one tube, depending on its size.

Adjusting Triggers of Rifles to Get Easy Action



Quick, snappy trigger action, which requires only 3 to 4 lbs. of finger pressure, is possible by slight alterations. Less than 3 lbs. pressure cannot be regarded as safe. Fig. 1 shows the most common trigger-and-hammer assembly. When the angle between sear point and hammer notch is as shown by the dotted lines at A of Fig. 1, the trigger pulls hard. By reshaping the parts as at B, the trigger works too easily which is unsafe, but if shaped as in detail C, it will work smoothly, quickly and safely. If the hammer notch is too deep, resulting in a long, slow pull, don't file away the front of it. It is much better to "pin" the hammer with a small piece of drill rod, as indicated in Fig. 2.

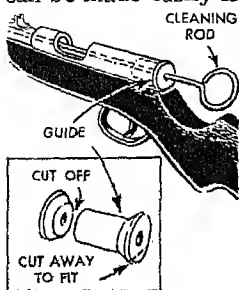
Fig. 3 shows the usual bolt-action type of firing mechanism. To reduce the pull, polish adjacent surfaces of the sear point and cocking piece along line AB. Be sure not to grind either point shorter, and do not bevel or round these surfaces, or the gun may discharge accidentally. Most bolt actions have a double pull for safety. In Fig. 4, the hump A, bearing against the underside of the receiver, is the fulcrum for the first two thirds of the trigger movement, drawing the sear point down out of cocking-piece notch, after which hump B

becomes the fulcrum. If you don't like a double pull, grind off hump A. Fig. 5 shows the change for British Lee-Enfield system. Never attempt stoning or grinding on any guns having sensitive firing mechanisms. Triggers of the kind shown in Fig. 6 can be improved. The original trigger is cut off and changed into a sear and a new trigger with double fulcrum B and C is attached by pin A.

Triggers of shotguns usually do not require much attention. When they must be lightened, however, the general principles explained in Fig. 1 usually will apply regardless of the type of action. For weighting trigger pull, spring scales are sometimes employed, but they quite often are inaccurate. A trigger weight made by soldering a wire hook to a small tin can, Fig. 7, is better for this purpose. The can is filled with shot or sand to exact weight required.

Spool Guides Cleaning Rod in Gun

When cleaning a bolt-action rifle, it is desirable to use a rod guide and stop. One can be made easily from an ordinary silk-thread spool. Remove the flange from one end and taper the body of the spool so that it will fit snugly into the gun. The flange should be in contact with the end of the receiver.—Edward Miller, Linden, N. J.

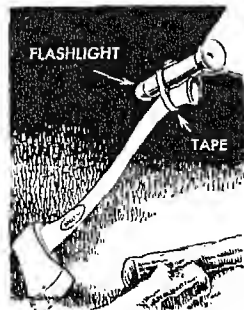


Small Cape Protects Shoulders Of Hunter's Coat

On long hunting trips, one sportsman always carries a small rubber cape of the type shown to prevent the shoulders of his hunting coat from becoming soaked during light showers. The cape is merely a piece of rubber cut from an old inner tube, or fabric cut from an old raincoat or other waterproof material. It can be rolled up and carried in a coat pocket when not in use.

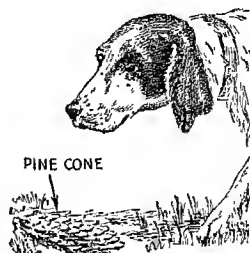


Flashlight Held in Any Position By Taping It to an Ax



When a camp chore requires that a flashlight be held at a certain angle for a time, tape it to the handle of an ax driven into the ground or a stump. This idea is especially handy when dressing game away from the tent or cottage.

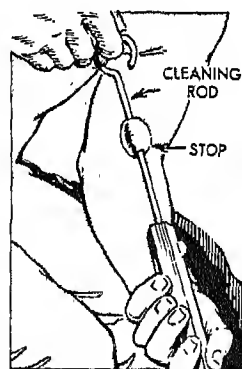
Pine Cone Teaches Retriever Dog To Carry Game Carefully



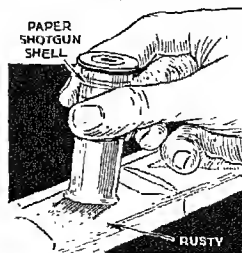
To break a retriever puppy of the annoying habit of biting and tearing game birds that you bag, try using large, dry, pine cones during practice training. Biting into one of these sharp cones a few times will quickly cure him and he will deliver the birds to you, unharmed.

Cleaning-Rod Stop Protects Rifle

If you have injured your finger when forcing a cleaning rod through a rifle, you will appreciate this simple stop. Formed on the rod with solder, it keeps the rod from slipping through the gun to its extreme length when the cleaning cloth emerges from the opposite end. The solder also helps prevent injury to the end bore of the gun by contact with the wire finger loop.



Empty Shell Helps Scour Rust Off Shotgun Barrel

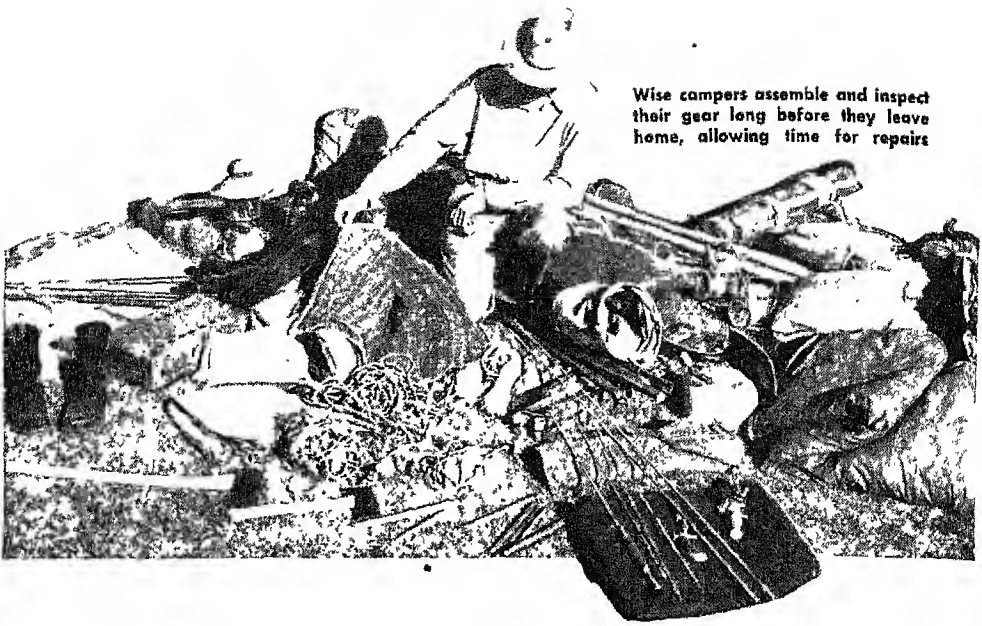


When removing rust from the outside surfaces of his shotgun and rifle barrels, one sportsman uses an empty shotgun shell to help speed up the job. The end of the shell is moistened with oil and then dipped into the abrasive and used as a scouring pad.

PART III



for the
CAMP ER



Wise campers assemble and inspect their gear long before they leave home, allowing time for repairs

GET READY for CAMP

By Claude M. Kreider

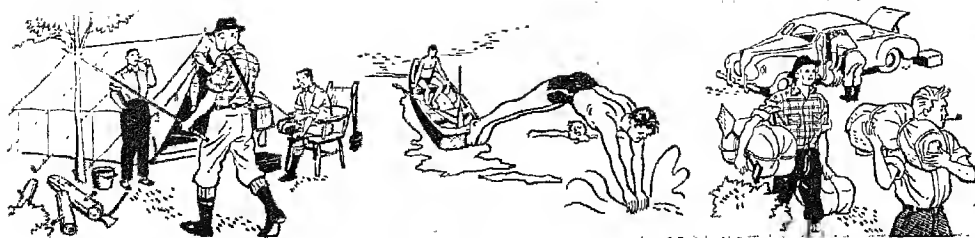
Photos by Ray Chapin

IF YOU belong to that increasing clan of real outdoor lovers who want to be entirely on their own when they go on a camping trip, you will find that it pays to check carefully over your camping equipment before you attempt to use it. A camping outfit does not need to be elaborate, but it must be complete, for your pleasure, comfort—and even health—will depend on the forethought you have given the individual items.

It is best to list first everything that will be needed under three headings—shelter, bed, cooking equipment. Then assemble the whole, piece by piece, for a thorough inspection, with special attention to items that have been stacked up in the attic since last year. You'll find forgotten wear and tear that will need attention.

The tent: Erect your tent in the backyard for a close inspection. First determine whether it is really waterproof. A new one may be guaranteed to be water-resistant, which does not mean it will shed a hard rain. Fasten down the door and window flaps and turn a hose stream on the roof and sides. If even a fine mist penetrates the fabric a real waterproofing job is in





order. The same test may be applied to the older tent, which may leak due to age and wear. There are many good waterproofing products on the market, most of them easy to apply.

The tent fabric should be inspected for holes, and patched wherever necessary. The peg loops may need repairing or replacing and the pegs—at least 12 for secure erection of the tent—should be straightened and scoured free of rust. Those made of light angle iron, with strong, welded half hooks, are best.

The tent pole and stretcher will need a

brief inspection. Often the clamp, which slides on the pole, will need new bolts or nuts and the pole itself may have swelled or become splintery. In this case sandpaper it smooth, then add a coat or two of boiled linseed oil, rubbing it well into the wood.

And finally, be sure that the mosquito curtain over door and window is intact and that it fits snugly at all points. Just one night of discomfort in mosquito country can spoil a trip.

The bed: Most experienced campers use sleeping bags, which retain one's body

An old-timer flips his flapjacks from the skillet of a nesting cock kit that's ideal for the camp kitchen





Air mattresses should be inspected or you may be in for a big letdown. Repair the leaks with a tire kit
Bubbles from mattress immersed in water show leaks



Nesting utensils of aluminum are light and compact. Table implements and a dishpan complete the kitchen



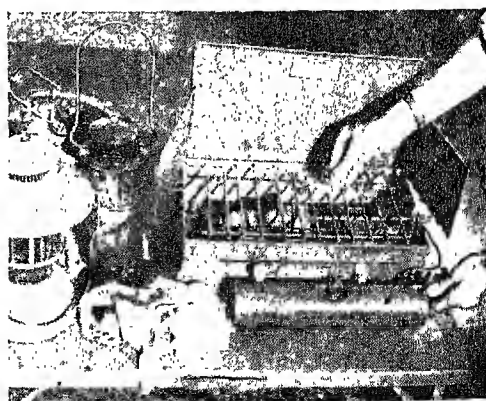
heat to give maximum warmth with minimum weight. The bag also offers protection to the bedding in transit and is ready to crawl into after a tiring day. Placed on an air mattress it will give maximum comfort, although many people prefer to use the bag on a canvas cot. In that case additional bedding may be needed underneath it.

A comfortable sleeping bag for one or two persons can be made at home by folding blankets or quilts inside a section of heavy canvas 6 by 12 feet in size. This is turned up to cover the bedding and fastened with large safety pins along the sides, simulating the cowpuncher's famous tarpaulin bed.

Estimate the weather likely to be encountered and apportion the amount of bedding accordingly. Remember, too, that wool blankets are warmer than cotton comforters and take less space. The air mattress—even if new—should be fully inflated and tested in a tub of water for possible pinhole leaks which, if not discovered, will surely let you down to the hard ground before morning. Leaks can be repaired easily with ordinary tire-patching material that requires a heavy coat of cement, which will fill the rough surface of the material and insure a tight patch. Inspect your hip boots or waders for possible leaks at the same time and patch them with the same material if necessary.

The cook kit: Carefully chosen utensils from the kitchen serve adequately if proper consideration is given the number of persons in the party, the type of cooking to be done and the bulk that can be carried. Often saucepans and kettles with bails—not handles—may be arranged to nest compactly, with the coffee pot, holding the cups, inside the assembly. A compact, nesting aluminum kit will give many years of serv-

Gasoline stoves and lanterns stored in attic dust may develop trouble if they aren't cleaned before the trip





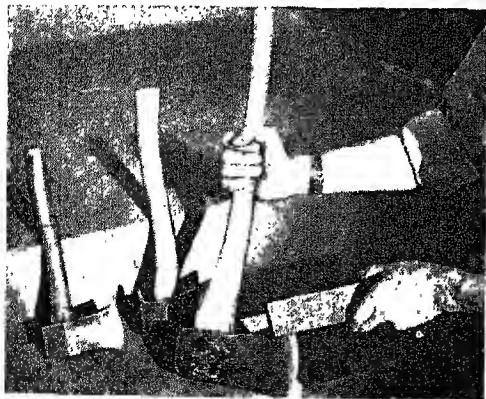
Good shelter means comfort to the camper. Pitch the tent and test it with heavy "rainstorm" from the hose

ice if the material is heavy gauge and designed for hard use. One popular kit has two cast-aluminum frying pans with detachable "cold" handles, fitting neatly over the largest of the kettles. The two-quart coffee pot with straight sides holds the cups. These should be of graniteware, as aluminum ones will burn the lips even while their contents are cooling because the metal is a good heat conductor. For this reason plates of aluminum are an advantage in outdoor cooking.

It's wise to have a cloth roll for all the table and cooking implements with a loop for each item. In addition to knives, forks, teaspoons and stirring spoons, a spatula



Large paintbrush makes waterproofing an easy job. ↓ Canvas bag is an ideal container for your bedding



and cake turner should be included. Don't forget a sharp butcher knife and a can opener. For cleaning dishes and taming the stickiest of frying pans include a can of powdered cleanser and plenty of steel wool. A dish mop and supply of dishcloths rolled up with the implements will complete the "kitchen." A large square of white oilcloth makes an ideal tablecloth for use on the ground or camp table.

The gasoline stove and lantern: These modern servants go far to take the curse from camping, but they are efficient only if given proper care. The stove tank should be drained of old fuel and refilled, and the burners brushed clean and lighted. If the air pressure drops quickly it indicates that the packing glands need tightening. If the pump leather is dry add a few drops of neat's-foot oil to give it a good, tight seal. If the stove has had much service a new generating unit may be advisable, for old ones become clogged with carbon.

The lantern should be emptied, refilled, carefully tested, and the same measures applied as to the stove. If the generator gives the least sign of trouble by all means replace it, for the tiny hole in the generator tube is difficult to clean out and rarely

works well after it has been cleaned. A supply of extra mantles should be carried in a compact metal box to prevent damage.

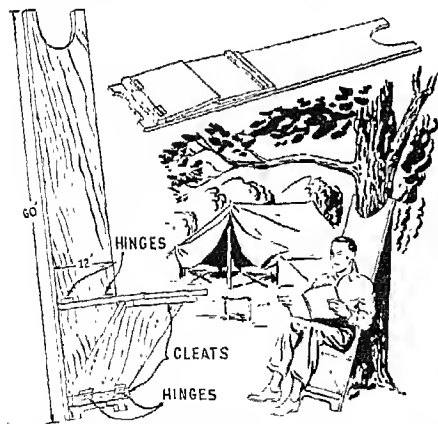
Finally—and most important—have a good, tight, gasoline can painted red for safety. Fill it at home with white gasoline, since neither the stove nor lantern will handle colored automobile fuel properly. The white, untreated gasoline is sometimes difficult to find when you are on the road.

A good ax of full or three-quarter size is always useful and may be a necessity in woods country where an evening campfire is wanted. It is required, along with a shovel, in national forest camps throughout the country. Sharpen the ax to a keen edge at home, using a good two-grit oilstone, and carry the stone along for later treatment of the ax and butcher knife.

Final tips: Include a simple first-aid kit, with the necessary antiseptics and bandages for minor wounds. Remember what pests mosquitoes can be and carry a bottle of proven "dope" to apply to the face and hands. Your druggist will know of several formulas that he can prepare. And last, take two supplies of matches with at least one supply in a waterproof can for use in emergencies.

Three-Piece Folding Camp Chair Leans Against a Tree

This chair requires very little storage space in your luggage, and is just the thing for those who frequently go on picnics, or short camping and fishing trips. It is especially handy when several persons must go



in one car, and luggage space is limited, as it folds flat so that two or three chairs can be carried on a fender or running board. The chair is made from a 1 by 12-in. board, which is cut out at the top to fit against a tree trunk and prevent tipping. Also, the bottom is cut to provide feet. The seat and its supporting brace are hinged in place so

that they will fold flat. Screwing the brace hinges to a cleat spaces it from the chair back to permit folding. When the chair is opened, the end of the brace engages a cleat at the outer end of the seat to keep the assembly from collapsing.

Kindling a Fire

The next time you are on a hunting trip and have no dry material for kindling a fire, a couple of empty shotgun shells will do the trick. There is enough wax in the paper of the shells to make them ignite easily if they are split into narrow strips with a knife.

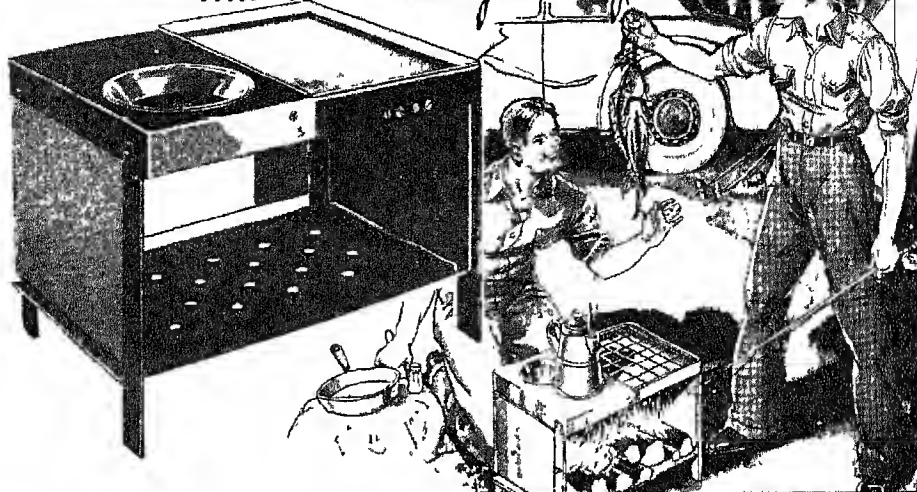
Sinkers Hold Tent Flap

Flies of a tent can be kept opened or closed by using heavy fishline sinkers, which are attached to the corners with large safety pins. If sinkers of sufficient weight are not available, small tobacco sacks filled with sand will serve.

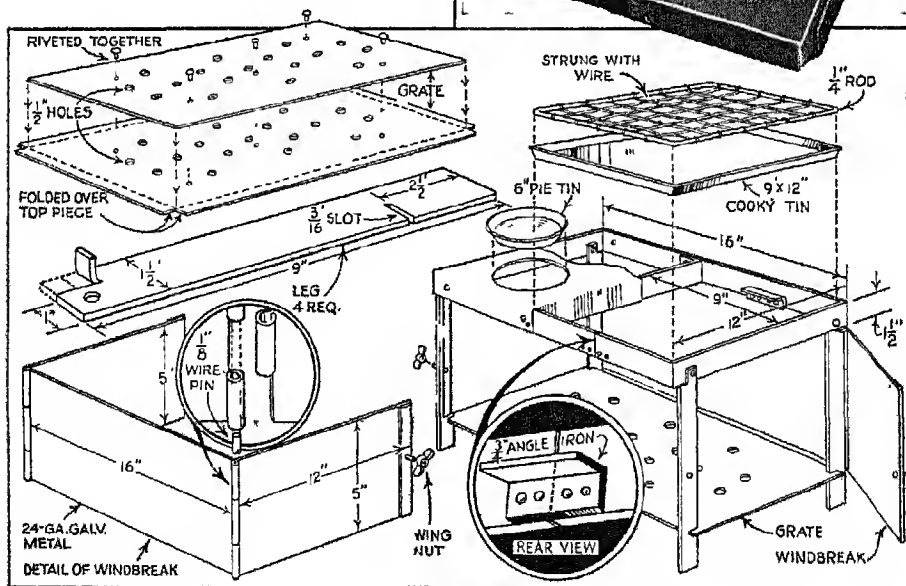
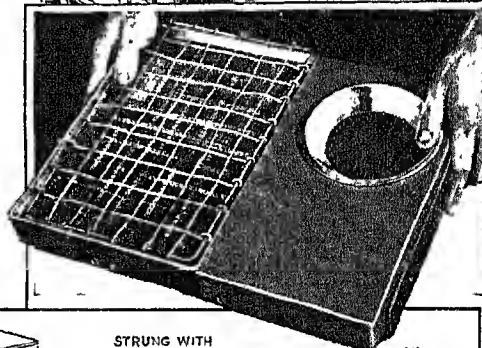
¶ To keep tent stakes from pulling out of the ground during damp weather, simply drive them in at the same angle as that of the tent ropes to which they are attached. The experience of many campers has been that this is more effective in moist earth than placing the pegs in the usual way.

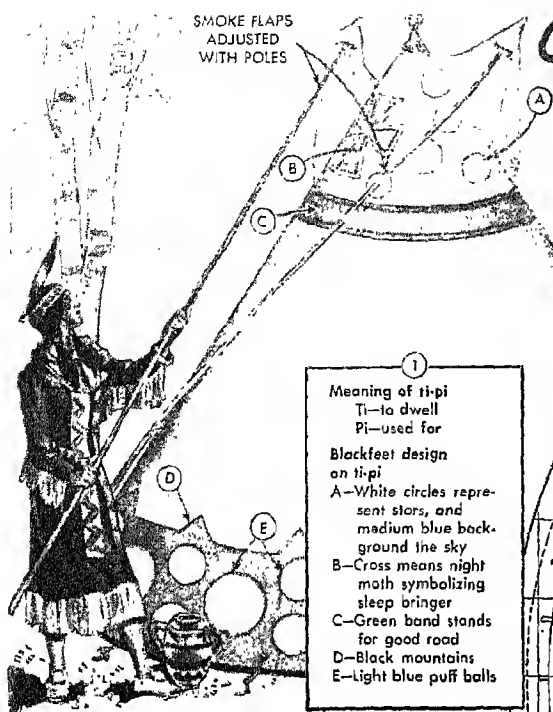
Portable CAMP STOVE

has interchangeable parts



Folding compactly for storage or transportation, this camp stove can be set up quickly for use. The windbreak, which encloses three sides, is hinged together and is attached to the front legs with two bolts and wingnuts. Either a tray or a grill can be placed in the large open portion of the top. Similarly, a circular opening is provided to take small pie plates, while the remaining portion supports a pan or coffee pot. The legs fold flush with the top. Note that the lips at the top of the front and rear legs are bent in opposite directions.





SMOKE FLAPS
ADJUSTED
WITH POLES

Camp Comforts INDIAN

① Meaning of ti-pi

Ti—to dwell
Pi—used for

Blackfoot design on ti-pi

- A—White circles represent stars, and medium blue background the sky
- B—Cross means night moth symbolizing sleep bringer
- C—Green band stands for good road
- D—Black mountains
- E—Light blue puff balls

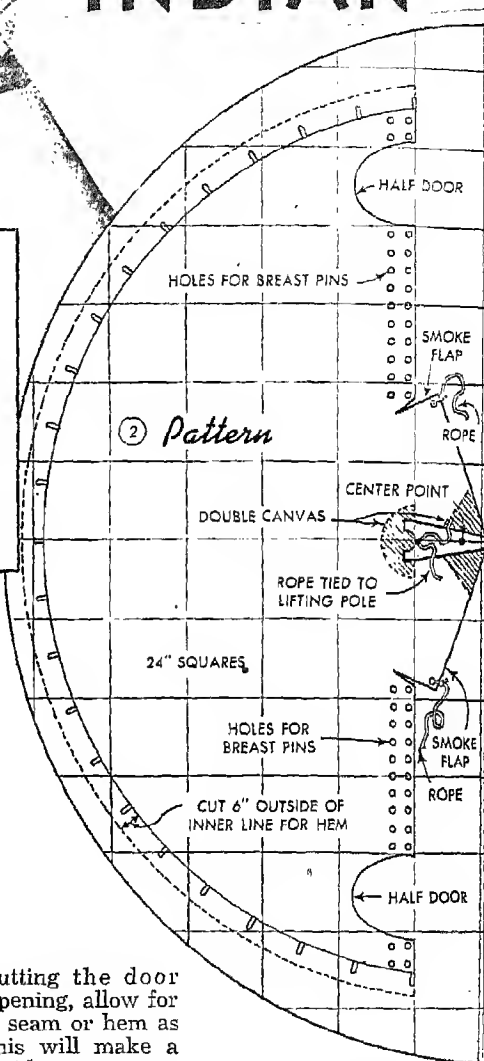
By Gray Wolf

WITH this ti-pi, (Indian word from which is derived the English "tepee") you can satisfy your yen for the primitive and still be dry and warm. In addition, a ti-pi is easier than a tent to transport, the covering and some small rope being about all that is necessary, as the rest of the equipment needed is available at your campsite. Size of the ti-pi depends on your requirements. For two people, the 10-ft. Blackfoot design shown is ample. Fig. 1 explains the various symbols in the design.

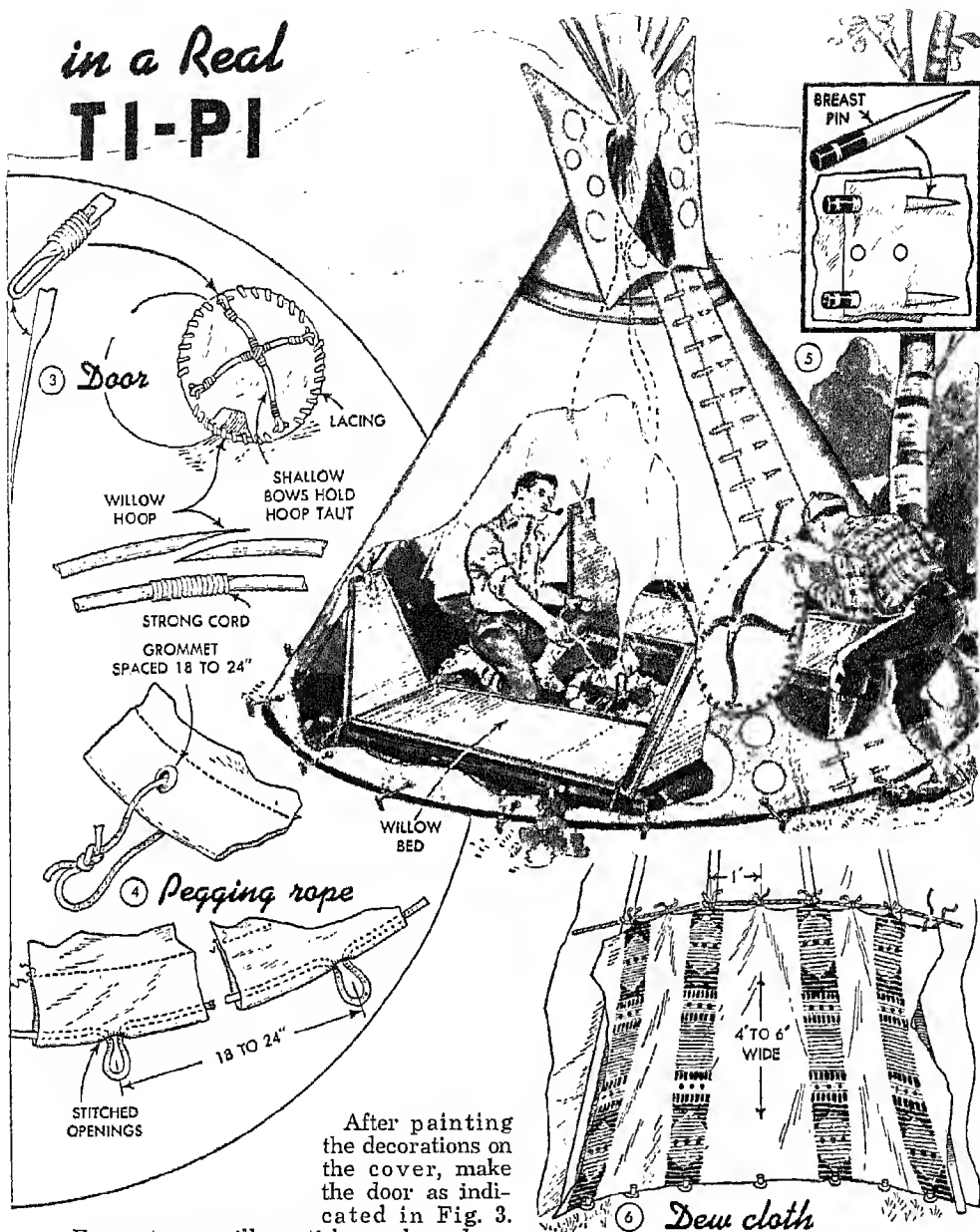
In making a ti-pi, first cut out the cover according to the pattern in Fig. 2. If possible, the cover should be cut from one piece of canvas without seams. Notice that the shape is not quite a complete half circle, the center point being located between the smoke flaps. Be sure to cut 6 in. outside of the inner line to allow for a bottom hem. This is sewed all around and grommets inserted at 18 to 24 in. intervals to take pegging ropes as in Fig. 4. Or, a rope can be sewed in the hem and loops brought out as shown, in which case the openings for the loops must be stitched to prevent tearing. Next, corresponding holes for breast pins are made and reinforced along the straight edges of the cover between the smoke flaps and the door opening, and also below the door, Figs. 2 and 5. In

cutting the door opening, allow for a seam or hem as this will make a rigid entrance.

At the top of the ti-pi another reinforcement of double canvas is made as indicated by the shaded portions in Fig. 2, and a rope sewn in between the two pieces for tying the cover to the lifting pole. Ropes tied through grommets in the lower points of the smoke flaps should reach to the ground, as they serve to tie the smoke flaps snugly in rainy weather. This completes the cover except for its decorations. Of course, these are not necessary, but for sake of realism they are well worthwhile. Many pictures are available on authentic ti-pi designs.

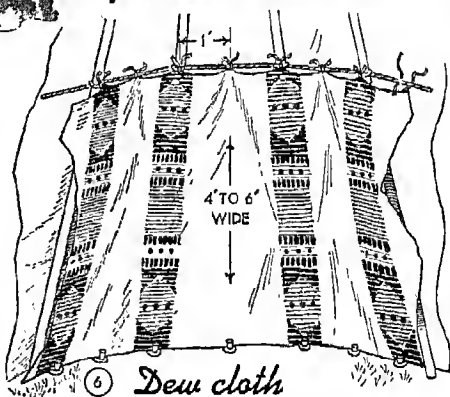


in a Real TI-PI



After painting the decorations on the cover, make the door as indicated in Fig. 3. From strong willow sticks, make a hoop about 6 in. larger than the opening, beveling the two ends to overlap, after which you lash them together with strong cord as shown. The cross bars for the door should be long enough to form shallow bows. Lace the door covering to the hoop, and at each quarter of the circle pass the cord through the looped end of a cross bar, allowing one end to extend to permit hanging the door to a breast pin. Tie the cross bars together at the center.

For added comfort, a lodge lining or dew



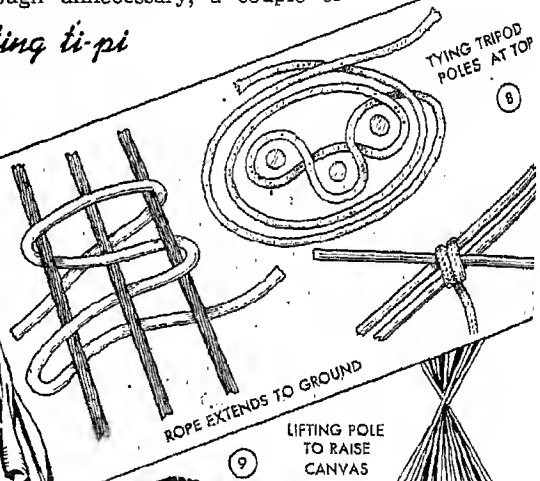
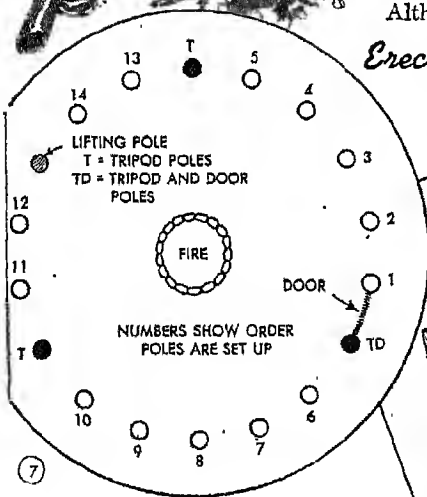
cloth as Indians call it, should be used. Make this from light canvas in several sections as in Fig. 6. Tie the top edge to a rope which is looped around each pole and peg the bottom edge to the ground. The sections should overlap. The lining serves several purposes: Extending from the pole on one side of the door around the ti-pi to the pole on the other side, it serves as a flue, causing the air that enters under the side of the ti-pi to rise between the canvas side and the lining, thus providing a draft



a tripod with equal distances between the poles. Fig. 7 shows the order in which other poles are set up, their upper ends resting in the crotch of the tripod. The last pole should be stout as it is the lifting pole. This is placed under the ti-pi cover and the tie strings at the top, Fig. 2, are fastened to it. Then the canvas is folded back, the whole thing is set in place, after which the canvas is brought around the framework, lapped over and closed with the breast pins. From inside the ti-pi, you gradually move the poles outward, one at a time, until the canvas is tight and smooth. Then peg the bottom to the ground. Put up the lodge lining, build a round stone fireplace and set the smoke flaps. To do this, insert slender poles into pockets sewed to each flap and then raise the flaps, crossing the poles as shown in Fig. 1. If the wind blows the smoke back into the ti-pi, move the flaps around in one direction or another until the draft is right. In case of rain, move one pole clear around to the front and move the other to close the opening. However, there still will be a small opening left for smoke to escape. In severe windy weather, tie the long rope extending from the top of the tripod poles to two pegs driven into the ground inside the ti-pi, using the clove hitch as in Fig. 10.

Although unnecessary, a couple of

Erecting ti-pi

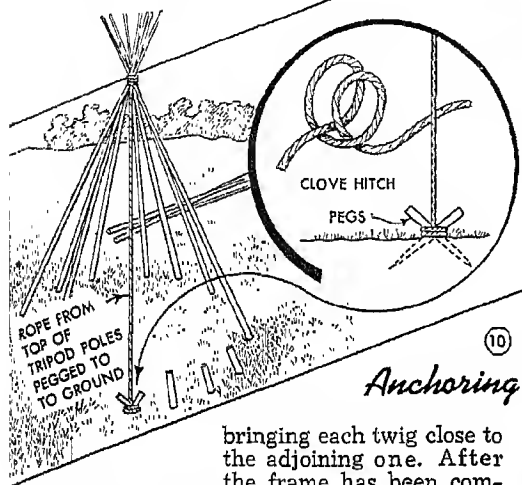


to carry the smoke up through the smoke flaps. Also, when you are seated inside the ti-pi the updraft is above your head. In case of rain, the lining prevents water that may run down the poles from dripping on you.

To set up the ti-pi, use sixteen slender poles 3 to 3½ in. thick at the base and about 3 ft. longer than the height of the ti-pi. Select three of the best ones, spread out the cover and lay two poles along the center and one on the edge. Tie them securely together where they cross, using the method shown in Fig. 8. Allow the rope to extend far enough to reach the ground when the ti-pi is raised. Now, lift the poles, Fig. 9, and spread them to make



willow beds made as shown in Figs. 11 to 16 inclusive will make sleeping more comfortable. Arrangement of beds and fire-place inside the ti-pi is shown in Fig. 5. To construct a bed, first make a framework to the dimensions given in Fig. 13 by driving pegs into the ground and tying strong cords between and across them. Next, cut and peel a number of willow twigs, making the longest ones 32 in. for the horizontal portion of the bed, slowly graduating the twigs in length to form the backrests. Drill or burn holes through the twigs 1 in. from each end. Next, place the twigs on the frame and lash them to the outer cords as in Fig. 14,

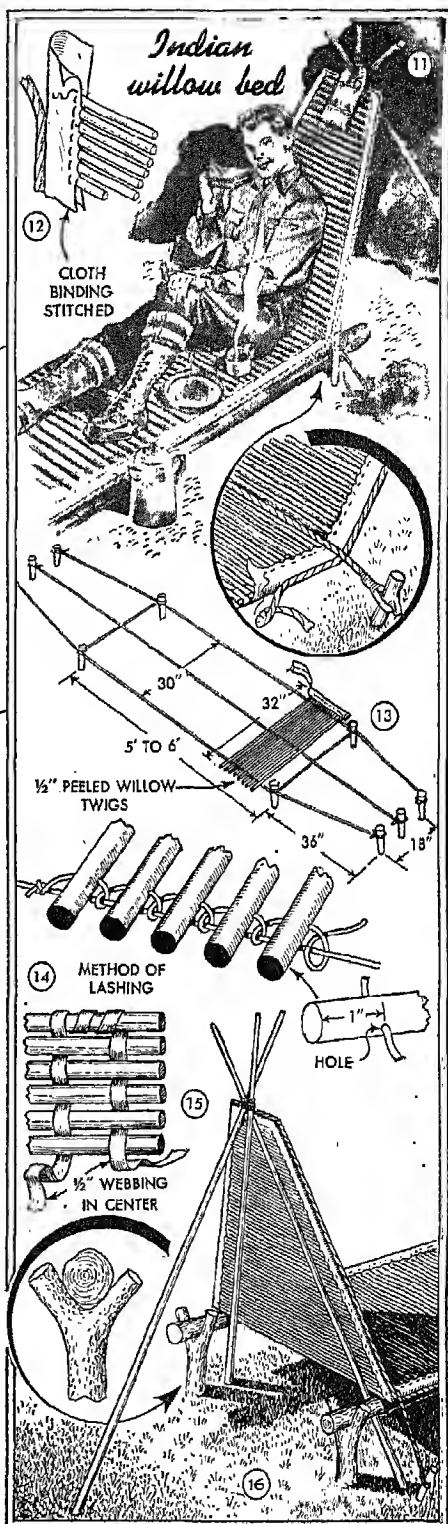


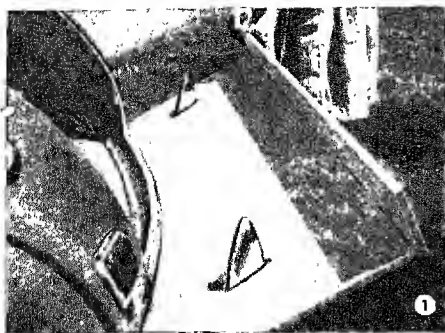
Anchoring

bringing each twig close to the adjoining one. After the frame has been completed, it is a good idea to bind the edges with strips of colored cloth by folding it over the ends as in Fig. 12 and stitching between the twigs. If greater stability is desired, weave $\frac{1}{2}$ -in. webbing through the center of the bed as indicated in Fig. 15.

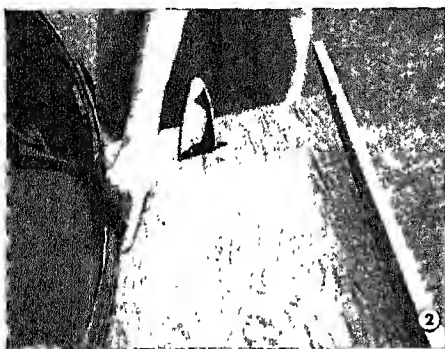
To set up the bed, select two logs and peg them to the ground as in Fig. 11. Place the bed on them and hold the backrests in place by two tripods. To hold the bed firmly, a cord should pass over the bed and be tied to a peg on each side as in the circular detail of Fig. 11. In damp weather set the bed on logs and forks as in Fig. 16. Select strong logs or poles that will support your weight without sagging in the center and lay them in the crotch ends of strong stakes driven into the ground to project at a uniform height.

A sleeping bag on one of these beds will enable you to sleep comfortably. However, if you have no sleeping bag, a long sack made of white duck and filled with beech leaves will provide a good mattress. When not in use as a mattress, the sack provides a good container for your bed.

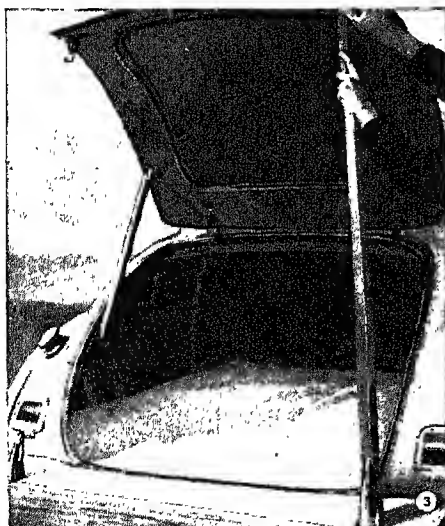




Slipped over the bumper guards to rest on the rear bumper, this extension board serves as support for the lower end of the double mattress



Although it is not necessary that the board carry a heavy load, for strength it should be a tight fit against the rear deck of the car

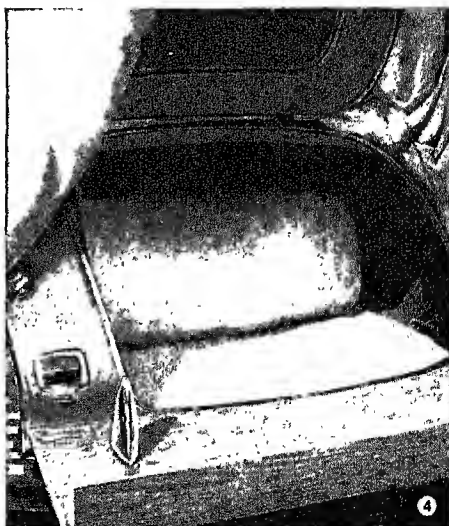


As a safety precaution, a wooden brace supports the rear-deck door. The base of the support is wedged tightly into the bumper guard

Rear-deck extension provides a comfortable bed for two, and a tarpaulin gives privacy. The entire outfit is stored in a small space in the rear of your car

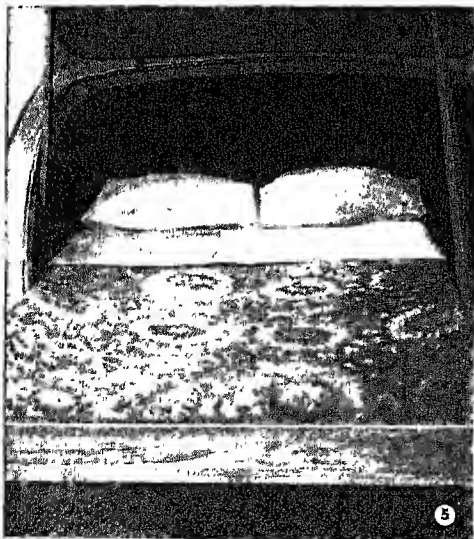
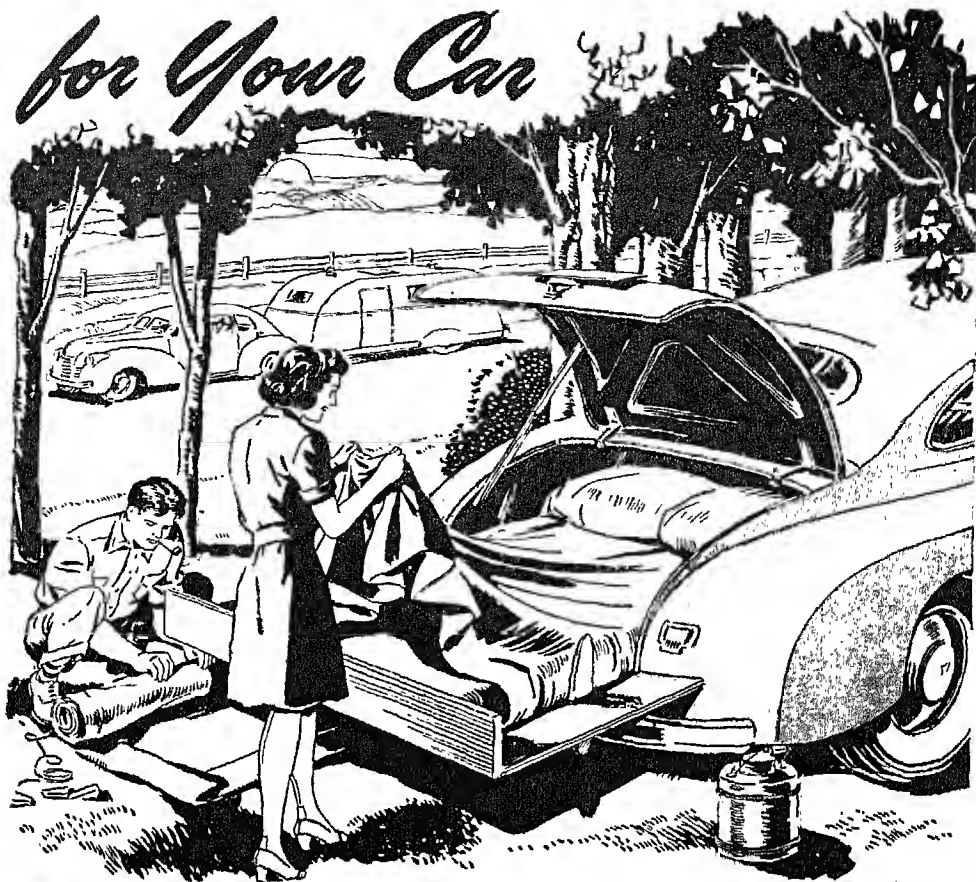
By Jim Robinson

THE roadside is your bedroom when your car is equipped with this rear-deck "sleeper". The rear-deck compartment on most coupes and even some sedan-type cars is roomy enough so that, if a short extension board is added, it can accommodate a double mattress. Since the dimensions of the extension will vary with different cars, it might be well to cut a paper pattern first, being sure it fits and is large enough to support part of the mattress. Both the extension board, Fig. 1, and the tailboard can be cut from $\frac{3}{4}$ -in. plywood. Note in Fig. 2 that the curved side of the board follows the curvature of the car closely. If necessary, hinge a support at the rear of the extension board to keep it in place. As a precaution, make a wood brace that can be wedged between the rear-deck door or cover and the bumper guard, Fig. 3. Figs. 4 and 5 show the completed bed. Finally, a tarpaulin, Fig. 6, is thrown over the rear deck and lashed down.



A pad placed on the floor of the rear deck protects the mattress, after which the latter is unrolled and the bed is ready to be made

for Your Car

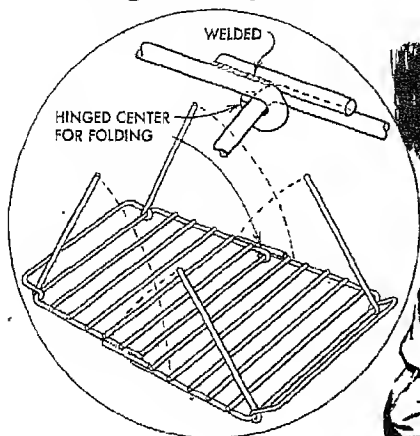


Bed is made up and ready for occupancy. The tailboard, fastened to the extension board, is an aid in keeping the mattress in position



As protection against weather and to insure privacy, a tarpaulin is thrown over the rear deck and tied to the bumper and door handles

Folding Campfire Grid Packs Flat for Carrying



The legs of this campfire grid, which is made of $\frac{3}{4}$ -in. wire, fold flat against the top, the latter being hinged in the center. When folded, the grid takes little space. No dimensions are given as they can be determined best by the builder. When the unit is set up, a short length of wire welded to one of the halves rests against the other half to hold the top rigid, as shown in the detail. All joints should be

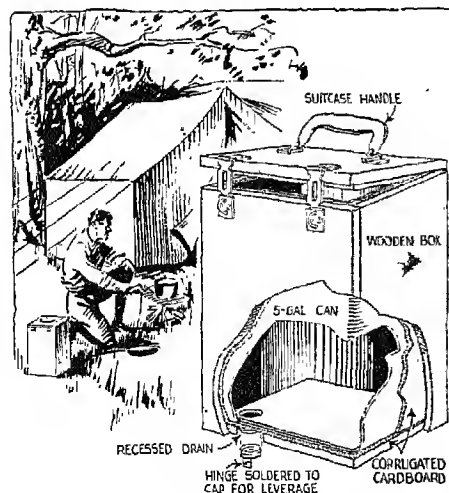


welded and the legs should be long enough to support the grid at the proper height from the fire when pushed firmly into the ground.

Lightweight Icebox for Camp Has Cardboard Insulation

Here is an icebox that is easy to carry on camping trips, and it will keep fish or other food fresh on a very small amount of ice. It consists of a square 5-gal. oilcan set inside a wooden box with corrugated

cardboard packed in the space between them. A clean, shiny can is best as it will tend to reflect heat. The bottom is cut out and the can inverted so that the filler hole is on the bottom where it serves as a drain, which can be closed when carrying the box in a car. A piece of hard-pressed board inside the can reinforces the bottom. The top of the box is hinged and it has a thin piece of wood on the underside to fit down into the can to provide a good seal. A suitcase handle completes the job.



Bottle of Soapy Water Is Handy When Going on a Picnic

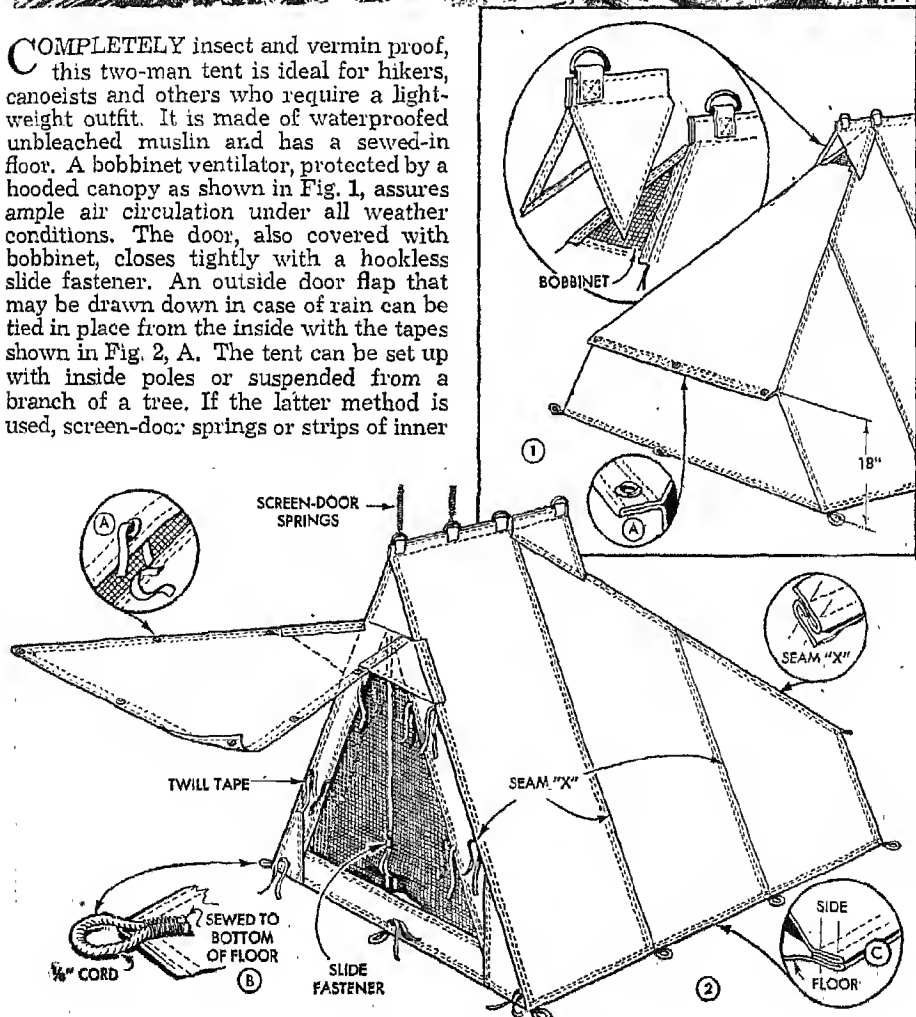
Before going on a picnic, dissolve a little soap in a bottle of water and take it along to wash the children's hands. A few paper towels or some pieces of cloth cut about 15 in. square complete the washing kit and save the regular hand towels.

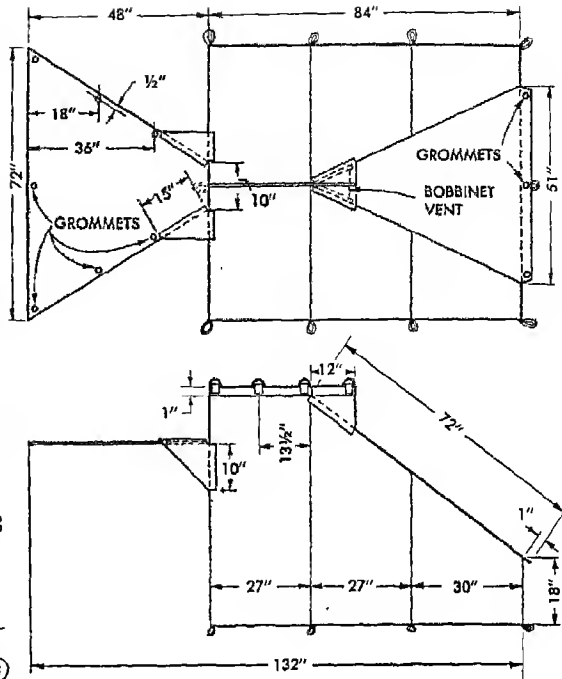
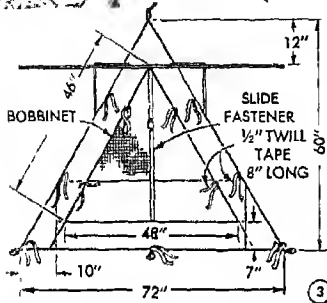
To sew patches on canvas tents, tarpaulins and hunting garments, soak the area to be patched and rub in soap. The needle will then slip through easily.

ALL-WEATHER TENT FOR TWO



COMpletely insect and vermin proof, this two-man tent is ideal for hikers, canoeists and others who require a lightweight outfit. It is made of waterproofed unbleached muslin and has a sewed-in floor. A bobbinet ventilator, protected by a hooded canopy as shown in Fig. 1, assures ample air circulation under all weather conditions. The door, also covered with bobbinet, closes tightly with a hookless slide fastener. An outside door flap that may be drawn down in case of rain can be tied in place from the inside with the tapes shown in Fig. 2, A. The tent can be set up with inside poles or suspended from a branch of a tree. If the latter method is used, screen-door springs or strips of inner

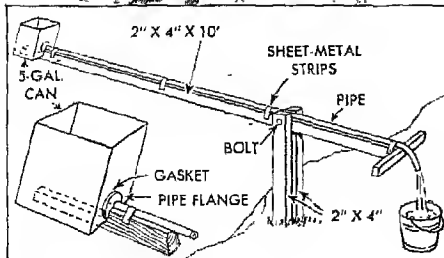
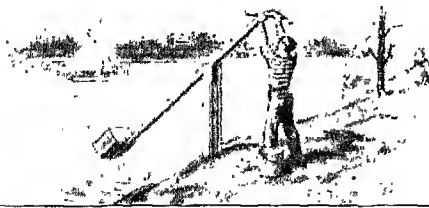




tube should be fastened between the tent and supporting ropes to allow for the swaying of the tree. Guy ropes are attached to the grommets, Fig. 1, A, to hold the rear wall vertical.

To make the tent, 20 yards of 80 by 80 unbleached muslin will be required. This is laid out and cut according to the dimensions given in Fig. 3. Care should be taken to allow enough material to make the various types of seams shown in the enlarged details of Fig. 1, A, Fig. 2 and Fig. 2, C. Loops of $\frac{1}{8}$ -in. cord then are sewed to the

bottom of the floor as indicated in Fig. 2, B, for the tent stakes. Other materials required are two spools of $\frac{1}{2}$ -in. twill tape, $1\frac{1}{4}$ yards of bobbinet or mosquito netting, one slide fastener 40 in. long, 10 grommets, 20 ft. of $\frac{1}{8}$ -in. rope, four "D" rings, approximately 450 yards of thread and 2 gallons of tent-waterproofing solution. A prepared waterproofing obtainable at most sporting-goods stores can be used, or a good waterproofing compound can be made by mixing 1 pound of paraffin and 4 oz. of beeswax in a gallon of naphtha.



Water for Summer Camp Lifted By Using Lever and Bucket

If you are camping by a river or lake where steep or muddy banks make it difficult to dip up water, use a simple water lift that can be operated from the top of the bank. The lever illustrated is about 10 ft. long, although this dimension will be governed by the height of the bank above the water. A 5-gal. can with the top removed serves as a bucket to catch the water, which drains out through a pipe along the lever into a container at the handle end. Two uprights and a bolt provide a fulcrum on which the lever pivots. If the distance between the fulcrum and the bucket is fairly great, a counterweight, attached between the fulcrum and the handle, will make it much easier to operate.

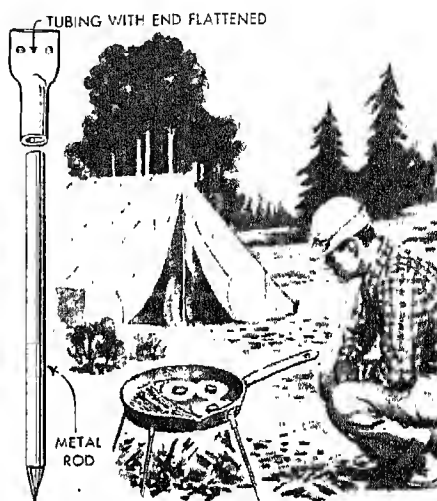
Potatoes Baked in Tin-Can Ovens While on Camping Trips



Where potatoes are baked in a campfire, considerable time is usually required as it is best practice not to put them in until the fire has burned down to provide hot coals. However, if you want to hasten the meal, baking can be done quickly by placing the potatoes under inverted cans and then building the fire over them. Thus, the cans serve as small ovens.

Metal Legs Support Cooking Pans Without Using Grill

For compactness and portability, cooking pans used on camping trips can be fitted with legs that require little space and are easy to make. The sockets for the legs are short lengths of tubing that have been flattened at one end and are either riveted or brazed to the pan. If brazed, the pan will be easier to clean because the inside surface will be smooth. The legs are metal rods of a size that will fit the tubing and one end is sharpened so it can be pushed into the ground more easily. The same idea could be applied to coffee pots as well as pans and skillets.



Auto-Casing Pads Ease Strain of Carrying Heavy Packs



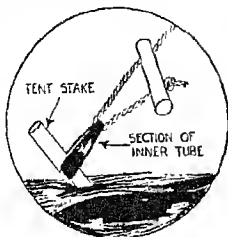
You can carry a heavy pack in comfort for long distances if the weight is distributed over both shoulders by a couple of pads cut from an old auto casing. These are slotted on both sides and threaded on the straps as shown. The pads fit comfortably and prevent the straps from rubbing and cutting into your shoulders.

Renewing Hunting-Knife Handles

Many hunting knives have handles made of leather or composition washers which tend to become soft or spongy after continued use. To restore the handle on such a knife, lay it in the sun or a warm, dry place for several days until the material is thoroughly dry, then apply several coats of clear shellac. When it is dry, the handle will be firm and waterproof, and just as good as new.

Automatic Tent-Rope Tightener

Uniform tension on the guy ropes of a tent can be maintained by using rubber bands at the stakes as shown. Bands about 1½ in. wide cut from old inner tubes are about the right size for an average camper's tent. In addition, the stakes will be less apt to pull or work loose since the rubber acts as a shock absorber.



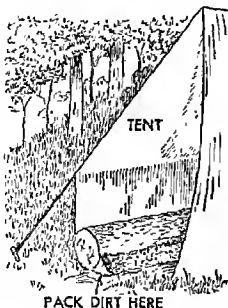
Making a Flashlight Buoyant To Float in Water



Fishermen and others who often use a flashlight where it may be dropped into water accidentally can avoid its sinking to the bottom by copying the idea of one fisherman. He attaches a medium-size jar, such as one used for olives, to the bottom of the flashlight case to serve as a float. To do this, the cap of the jar is soldered to the bottom of the flashlight. When not needed, the jar is unscrewed and laid aside.

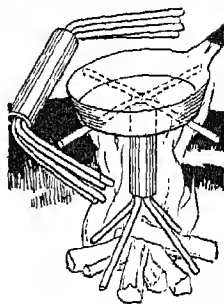
Tent Walls Held Down With Logs to Exclude Insects and Water

Campers who pitch a tent for several days at a time will find this method of fastening down the side walls of the tent ideal for keeping out insects and water. Just place small logs inside the tent next to the walls and fasten them to the logs. Pack dirt along the inner sides of the logs as indicated.

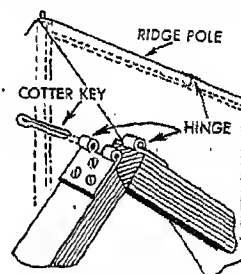


Simple Homemade Camp Stove

A portable camp stove can be made by inserting four iron rods through a short length of pipe and then bending them as indicated. The rods may be spread apart to support a utensil over a fire, or folded over a fire, or folded for carrying.



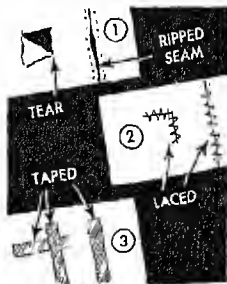
Preventing Loss of Hinge Pin When Tent Pole Is Folded



If the ridgepole of your tent is hinged to fold for convenient packing, and you occasionally lose the loose pin, substitute a cotter key for it. The key should be cut off so that it does not project to damage the tent cloth. Inserted in the hinge, after the pole has been folded, the key will spread sufficiently to hold itself.

Adhesive-Tape Repair for Tent

That camping trip needn't be spoiled because you find a tear in the tent and suddenly hit a spell of rainy weather. Many outdoorsmen carry a roll of adhesive tape for just such an emergency. To repair the tent, punch a series of holes on both sides of the tear or rip, detail 1, and sew it with fishline or string, detail 2. Finally, cover the seam with adhesive tape, as in detail 3, and you have a patch that will stay put.



PART IV



for the
TRAPPER

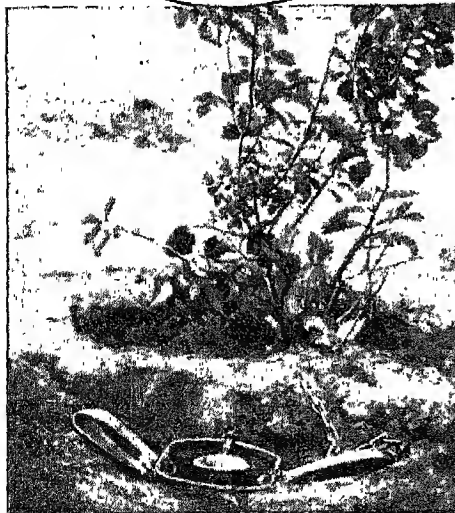


TRICKS *of*

By George L. Lewis

ALTHOUGH most fur-bearing animals can be trapped only during the "open" season prescribed by law, wolves and coyotes are considered so destructive to livestock that they may be caught at any time. In fact, many states pay a bounty for killing them. Before setting your traps, therefore, it is best to consult the laws of your state to determine when certain kinds of animals may be trapped. Wolves are numerous in Alaska and Canada, although they are found in considerable numbers in many sections of the United States as well, especially in the South and West. Coyotes, which are sometimes called "prairie wolves" or "brush wolves," are found in all far-western states and in many other localities as far east as New York. Usually bobcats and badgers inhabit the same sections, and foxes can be found in most parts of the country, though they are more numerous in the East. Minks and muskrats are plentiful in every state, in Alaska and Canada.

There are many methods of trapping, some of which require much equipment, but simple ways generally will be found highly successful and much less expensive, and will assure a reasonable return on the money invested for supplies. Steel traps for coyotes can be used also for foxes, bobcats and badgers. Sizes 4½ and 14 are best for wolves, size 3 or 4 for bobcats, badgers, lynxes and coyotes, and size 2 for foxes. The "jump" type, in the left-hand detail of Fig. 3, and the regular double-spring type, Fig. 2, are satisfactory. Gloves should be worn when handling traps used to catch land fur bearers, as any strange scent may frighten them away. For this reason it is unwise to smoke when attending your trap line. Also, before being used, all traps should be boiled for a few minutes in a tincture of sage leaves, tree bark, pine needles or grass to eradicate human scents and substitute, instead, the natural odors familiar to animals. Of course gasoline, ker-



② SETTING TRAP FOR COYOTE

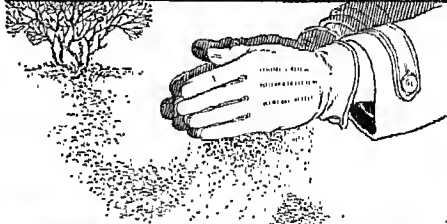
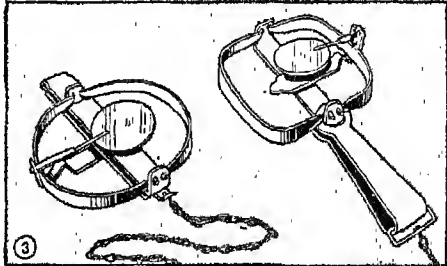


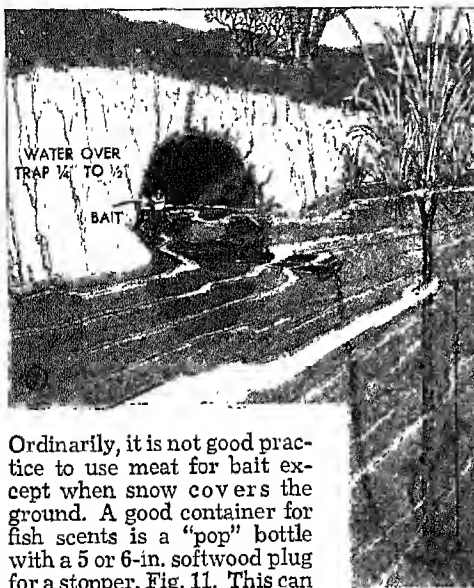
TRAPPING

osene, creosote and other volatile or pungent preparations used in camping must be kept as far from the traps as possible.

Coyotes will not approach traps set near trees, large stumps, rocks or brush, or among thick bushes or timber. The ideal place for a trap, therefore, is an open space about 30 ft. in diameter, nearly devoid of vegetation, where there is little grass, and where a bush grows not more than 16 in. high. If no small bush grows naturally in such a place, one can be transplanted, as in Fig. 2. The earth must be fairly dry and not contain gravel. Traps for all land animals except bears should be staked down securely.

In preparing a set, first make a depression in the ground just wide and long enough to take the trap. This can be done best with a small hatchet or camp ax, Fig. 1. Although the trap shown beside the hunter has only one spring, the double-spring type should be used if the set is made for coyotes. The hole should be deep enough so that after the trap has been covered with a sheet of newspaper or strip of burlap and $\frac{1}{4}$ in. of fine dirt, the set is level with the surrounding earth. To spread the dirt, rub it between gloved hands as in Fig. 4, discarding all stones and large lumps. Keep all kinks out of the trap chain so that it will not rattle when an animal steps on it, and remove your tracks by brushing the surrounding ground lightly with a piece of cloth as in Fig. 5, or the scent bag shown in Fig. 12. For bait, apply scent to the top of a wooden stake that has been driven flush with the ground on the side of the trap nearest the bush so that the coyote will not step on the chain to get to the bait. The trap chain should be wired securely to the stake. For bait, oil of anise, 1 oz., added to ground carp, sucker or trout that has been allowed to decompose in a glass jar is satisfactory, though many other materials can be used. As a rule, each trapper prefers the particular type of bait that seems to be most attractive to the animals that are to be trapped.



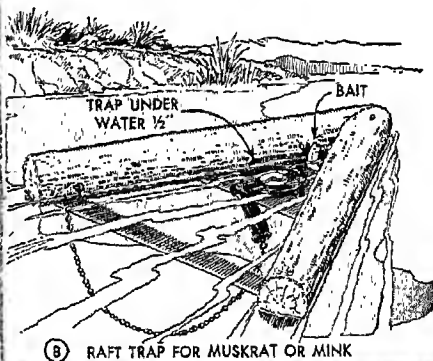


Ordinarily, it is not good practice to use meat for bait except when snow covers the ground. A good container for fish scents is a "pop" bottle with a 5 or 6-in. softwood plug for a stopper, Fig. 11. This can be removed easily without getting any of the scent on your hands. For a cover to protect the bottle from breakage, the sleeve of a discarded sweater or the leg of a pair of overalls sewed together at one end is excellent, Fig. 12. Moreover, the cover can be used to brush away footprints from around trap sets, thus making it unnecessary to carry extra equipment for this purpose.

Another way of setting a trap for large animals is to conceal it on a game trail regularly used by them, where it is secured by a peg driven down out of sight and covered with dirt. No scent is used for this type of set. When trapping coyotes in this way, great care must be taken in placing the trap on the trail, as coyotes are extremely wary. A trail out in the open should be selected, and the trap must be set not closer than 20 or 30 ft. to rocks,

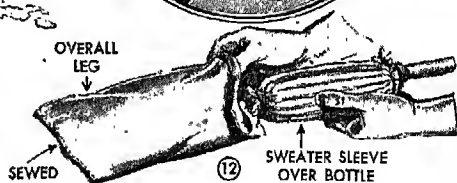
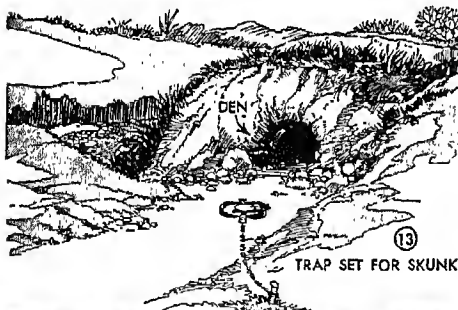
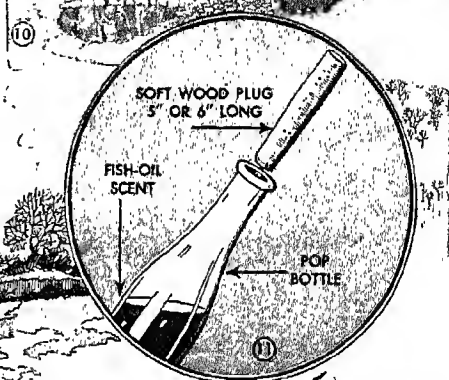
trees, bushes or fences. Also, traps should not be set in the bed of a deep wash or dry ditch. On the other hand, for bobcats, wolves, foxes and badgers, these precautions are unnecessary. Lynxes can be caught right at the base of a tree. After completing a trail set, place a small stick or piece of brush directly across the trail about 2 in. from the concealed trap as in Fig. 6. In approaching the stick, a coyote will space its steps so as to step over it and directly into the trap.

Because of the great numbers of muskrats to be found in almost every pond, stream and lake, the pelts of these animals account for a great proportion of the average trapper's income. Muskrats are comparatively easy to trap if one important fact is kept in mind: their legs and feet are tender and brittle. If the animal is not drowned within a few seconds after being caught in a trap, it will twist off its leg and escape, and the trapper will have lost a valuable pelt. A number 1 or 1½ trap, such as shown in the right-hand detail of Fig. 3, is suit-



able. Set the trap near the edge of the water close to the animal's den so that the trap will be submerged to a depth of $\frac{1}{4}$ in. Be sure that the water within a foot or two of the trap is at least 2 ft. deep, Fig. 7, or add as much wire to the trap chain as necessary so that when caught, the muskrat can swim to deep water and drown. In cold weather, holes are cut in the ice to make the sets. Fig. 10 shows a rat being removed from such a set. Bait is placed on a small stick near the trap so that the muskrat must get into the trap in trying to reach it.

Where depth of water in a stream fluctuates, a raft trap can be used. This is made of poles or logs 6 to 9 in. in diameter and 18 to 24 in. long. These are joined at one end and braced at the other as in Fig. 8, a narrow board being nailed between the logs as a platform on which the trap is secured. This will be kept submerged by the weight of the logs. The set should be near water at least 2 ft. deep so that the muskrat will drown immediately. Parsnips are best for bait, though carrots, apples, potatoes and celery may be used. The same size trap is suitable also for mink, skunk, weasel and marten. Of these,



the mink has the most valuable pelt. This animal lives near water, its den being above water in the bank of a stream or shore of a lake or pond. The mink is a meat eater, feeding on fish, frogs, small turtles, crabs, crawfish, birds' eggs, mice, muskrats and rabbits. Traps should be set near driftwood at the water's edge, Fig. 9, and should be covered with rotted wood, dry leaves, grass or feathers as in Fig. 14. Also, the ground near the trap should be sprinkled with water as in Fig. 15 to remove all traces of human scent.

Traps for weasel and marten need not be set at the water's edge and can be left exposed. Although fish-oil scent can be used for bait, rabbit flesh or the heads and entrails of chickens are more satisfactory. Be sure, in removing a weasel from the trap, that you do not allow the white fur to become bloodstained, as such stains are



MAN SCENT DESTROYED
WITH WATER

almost impossible to remove from the fur.

Skunks have no fear of traps, which can be exposed as in Fig. 13. Also, it is best to set the trap several inches back from the den entrance and stake it with a chain so that the trapped animal cannot drag it



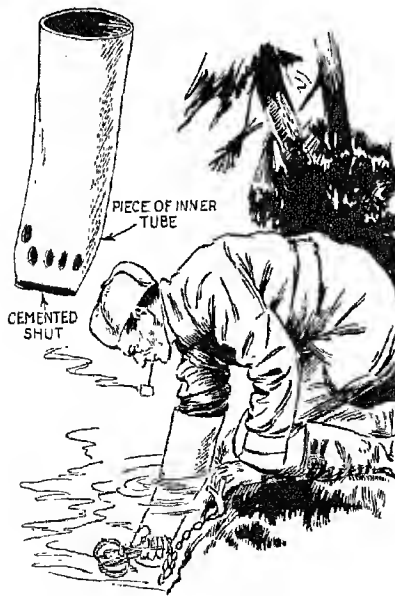
ALUMINUM DISK
CLAMPED TO
PAN OF TRAP

WATER SET
FOR RACCOON

down the burrow, as you may have considerable trouble digging out the animal. For bait, fish-oil scent may be used, but in larger quantities than for coyotes. This should be mixed with decayed meat or strong cheese. When caught, skunks should be shot with a 22-cal. rifle.

Raccoons prefer thickly wooded country. They frequent streams where heavy timber grows at the shoreline and are caught most often at the water's edge. Set your trap so that water covers it to a depth of $\frac{1}{2}$ in. as for a muskrat set, but instead of using regular bait, clamp a shiny metal disk on the trap pan as in Fig. 16, or the pan can be coated with aluminum paint.

"Rubber Glove" From Inner Tube Protects Trapper's Arm

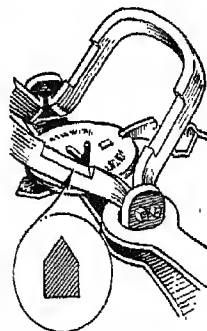


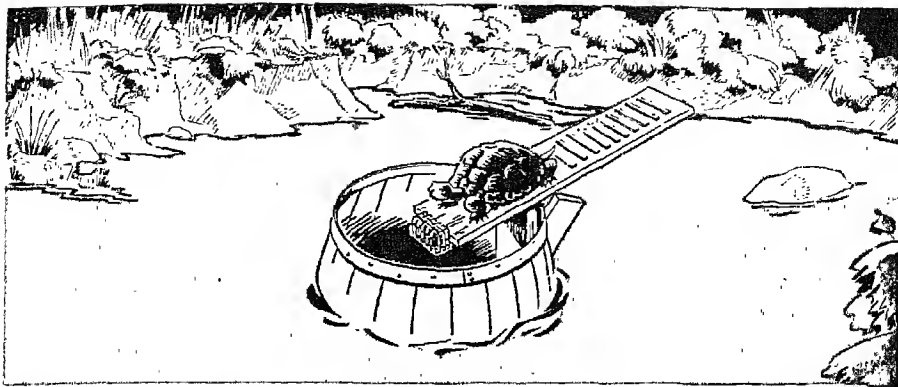
Trappers and fishermen who have occasion to reach under water to attend traps or fish lures during cold weather, will find

this rubber glove a comfortable protection for their arm and hand. Finger holes are cut in one end of a section of inner tube, which is then cemented shut. The holes should be small enough to make a snug fit around the fingers so water cannot enter.

Jaws of Steel Trap Beveled To Cut Through Trash

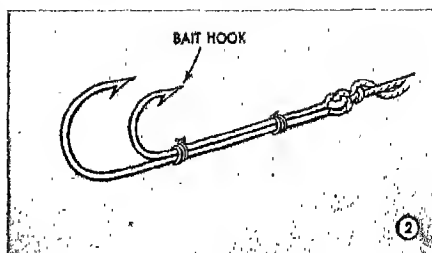
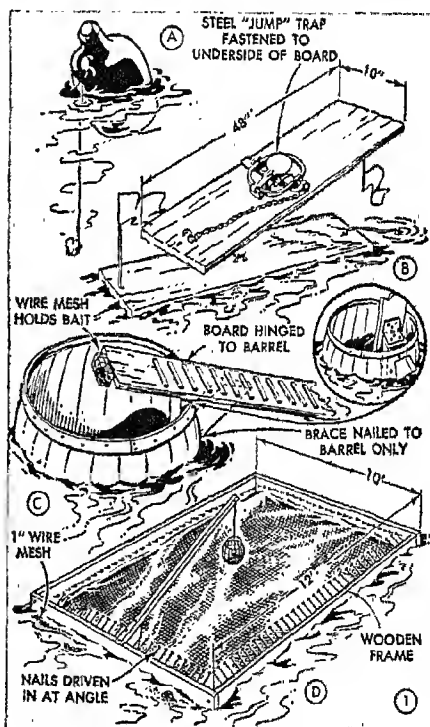
When the jaws of a steel trap are buried under leaves and small twigs, sawdust and similar material, it often happens that the trash will prevent the jaws from closing completely when the trap is sprung, thus allowing the animal to escape. To assure that the trap will hold under these conditions, one trapper files the lower ends of each jaw to the shape indicated, care being taken not to weaken the parts unduly. This edge will snap small twigs and will crush a thin covering of light material sufficiently to allow the jaws to close.





Turtle Traps That Catch 'Em

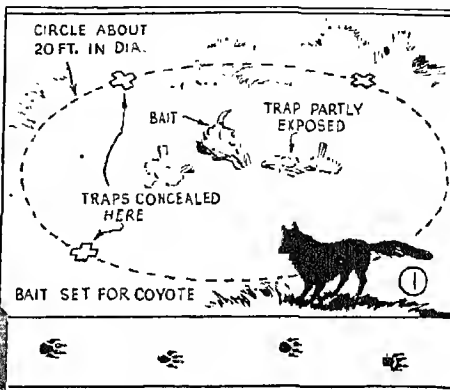
Turtles take a heavy seasonal toll of the spawn and fry of game fish and the young of waterfowl and small furbearing animals. The big soft-shelled "snappers" generally are the worst offenders and usually are the most numerous. Frequently it is necessary to control them or reduce their numbers as a measure in wild-life conservation. Fig. 1, A to D inclusive, details four traps that are easy to make and operate without constant attention. They are especially effective in ponds and the still backwaters of rivers and creeks. As turtles do not frequent swift water, anchoring the traps is a simple matter. The first, Fig. 1, A, is merely a half-gallon jug, tightly corked, and carrying about 30 to 36 in. of line, a heavy wire leader and a stout barbed hook baited with raw beef or flesh of the carp. Scaled fish are not attracted to either of these baits. Several such traps in a pond or still backwater will reduce the turtle population in a short time if regularly attended. Ordinarily this trap does not require anchoring in a small pond. Fig. 1, B, shows another type, the detail being self-explanatory. Bait is attached to the trap pan and the board is turned upside down. This trap can be anchored in a slow current. Detail C shows a more elaborate affair in which the design takes advantage of the turtle's habit of clambering onto partly submerged logs along the water's edge. Once adjusted and set afloat this trap is fully automatic. The hinged board tips so the turtle slides into the barrel, then the board returns to the original position, ready for the next customer. The trap shown in detail D is fully as effective in large ponds and there are no moving parts. And finally, by using two hooks tied together in the manner shown in Fig. 2, you can catch turtles with ordinary fishing tackle.





Outwitting the

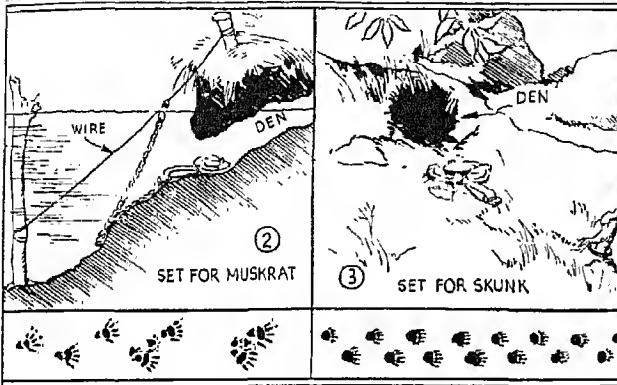
By Maurice H. Danvers



PELT hunters who know the tricks of the trade usually begin "prospecting" for fur long before the legal trapping season opens. The experienced trapper makes it his business to study constantly beforehand the doings of the animals he intends to catch. He knows that during the late summer and fall is the best time to locate tracks and dens, for it is during this period that fur-bearing animals are most active in preparing winter quarters. So he makes a mental note of all the muskrat "slides"—all the dens in the banks of streams on his prospective trap line. He checks up carefully on all "used" burrows of the smaller animals in the fields and woodlands of his locality. Then when the legal season opens he knows just where to set his traps to take valuable pelts.

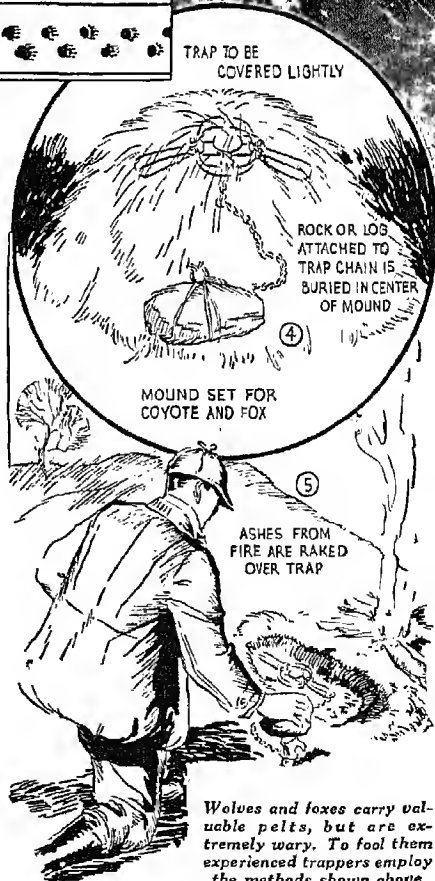
You'll find tracks of such smaller animals as the mink, along tiny, meandering streams in open country, in marshes and about the driftwood lodged along the banks of the larger creeks and rivers. While you're looking for mink, watch for the broad tracks of the raccoon where the stream passes through areas of heavy timber. You are likely also to find signs of opossum in the same locality. Look for muskrat tracks at the water's edge along the banks of small streams. The entrance to the den is under water and you are not likely to spot it unless you examine the shore line closely. "Slides" will be found on sloping clay banks where the stream passes close to a cornfield. These are shallow, trough-like concavities made by the animals sliding down the steep bank into the water. In marshes, the "rats" live in colonies, building mound-like "houses" of rushes in which they find refuge during the cold winter months. Fox, skunk, and civet signs will be found in rough, brushy territory with the dens along fences, under large rocks or along hillsides. Of course, the habits of these common animals vary somewhat with the nature of the locality. The coyote usually prefers the open plains

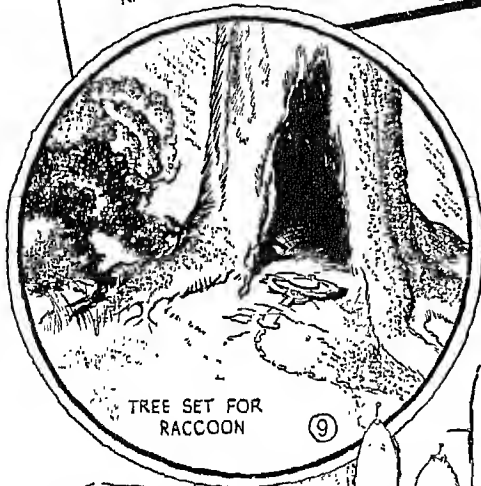
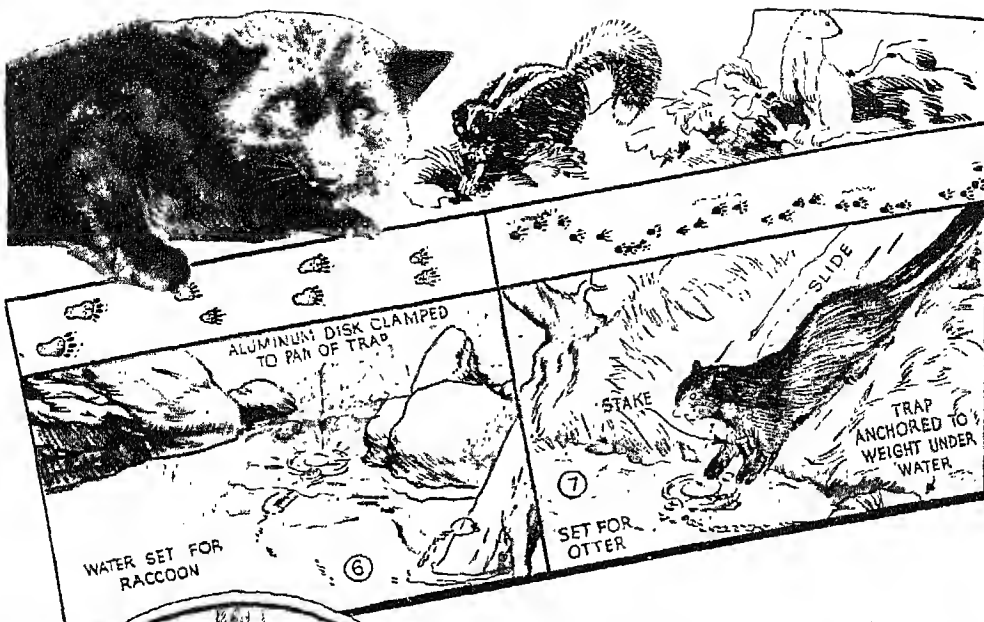
FUR-BEARERS



but is also found in mountainous sections. Some fur bearers, such as skunk, hole up during severe cold weather, while others, the mink, for example, will be found abroad the year 'round.

Now to make the sets. Bright, new traps should be buried in the damp ground for a week or so, to color with rust. Whenever possible, sets should be made in the water, for this destroys the human scent which wary animals quickly detect and avoid. When sets are made on land the traps are covered with a light material which will not clog the triggers. The important thing in making a concealed land set is to use covering material native to the locality, that is, if the set is made among dry leaves, use these to cover the trap. Carry a small wad of cotton or wool to place under the trap pan. Fig. 1 shows a practical bait set for coyote and fox. Offal from the local slaughter house is just the thing for bait. You will see that a couple of traps are placed carelessly near the lure, but in a circle roundabout three or more traps are very carefully concealed. These animals are extremely wary and you must be clever if you are to fool them. Have your traps chained to drags—a log or stone of such weight that the animal, if caught, can drag it only with





Pelts properly fleshed and shaped over suitable stretchers bring top market prices. They should be hung separately on a wall where there is ample circulation of air

difficulty. Traps for the larger fur bearers should never be staked. Two more "sure-fire" sets for these same animals are shown in Figs. 4 and 5. The former is particularly effective for fox, as these animals like to survey the countryside from an eminence. The latter is best for both coyote and wolf, because of the habit of digging in old campfires. To make the first set, a load of barnyard manure dumped in the center of a field away from habitations is just the thing. Conceal a large stone or a log at the edge of the mound and leave undisturbed for a week or more. Then carefully set a trap as shown and attach the chain to the drag. No bait is used. To make the second set, build a fire in some locality the animals are known to frequent. Then, beside the fire make a shallow excavation just deep enough to drop the trap and drag below the level of the ground. While you're doing this throw a few scraps of meat into the fire. Remove to some distance all the fresh soil from the excavation and set the trap. Then rake the ashes of the fire over it, taking care that these do not clog the trigger. The ashes should fill the excavation slightly above the ground level.

Fig. 2 shows a typical set for muskrat at the underwater entrance to the den along stream banks. The important thing here is to see that the wire holding the



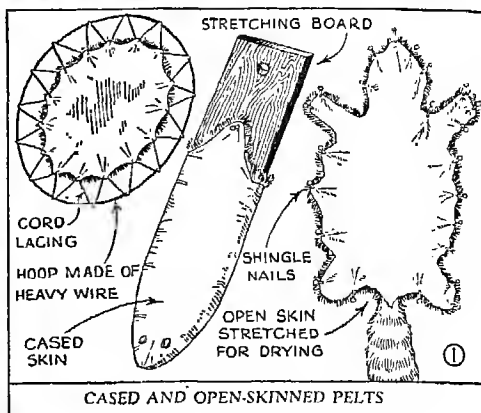
trap chain leads to deep water, so that when the animal is caught it will drown at once. This also holds when making water sets for beaver and otter. One trick in taking otter is shown in the set made as in Fig. 7. A short stake is driven into the slide about 16 or 18 in. above the water's edge. In coming down the slide these animals fold the front legs under the body. When they strike the stake the front legs are naturally thrown forward—and into the trap. Experienced trappers take beaver by making breaks in the dams at the water's edge. Traps concealed in these openings catch the animals as they set about making repairs.

In most localities skunk and opossum can be taken easily with the den set as in Fig. 3; also the hollow-tree set in Fig. 9 will catch the opossum if the den shows signs of being "used" by this animal. One of the simplest and best sets for raccoon is shown in Fig. 6. Here the trap is buried in the sand at the water's edge and a small disk of aluminum or other non-rusting bright metal is clamped to the pan of the trap. The raccoon is something of a fisherman and he has the habit of striking at any bright object that flashes underwater. Thus you catch him with this simple trick. Another water set that will take pelts is shown in Fig. 8. The set can be made in either a stream or a spring—better the latter, unless you can find a small pool or eddy in a creek or river. An attractive bait is placed on a rock about 3 ft. from shore, and half way between the bait and

the water's edge you build up an "island" of mud and stones for the trap. Cover the trap lightly with a piece of sod. In trying to get the bait, the animal, not liking to wet its feet, will step on the sod hiding the trap. This set has been found to be especially good for catching fox.

Pelts should be fleshed after skinning, shaped over suitable stretchers and hung on a wall where there is ample circulation of air, as in Fig. 10. Furs that are properly handled after taking, bring top prices on the market. To bring the highest prices, pelts not only must be properly cured, but they must reach the buyer in good condition. One trapper recommends packing hides with the flesh side out, using strips of cured birch bark, or heavy cardboard dividers, to prevent sweating. In shipping by mail, he provides plywood backing sheets for the bundles to keep the hides flattened. If the pelts have been exposed to freezing weather see that they are properly dried before shipping. Remember, too, that the laws governing the trapping of certain animals in the various states and provinces are very rigid due to scarcity of the animals in question. Practically all states require a trapping license. Know the law before you set your traps.

PREPARING YOUR



By ROYCE M. ROATH

WHILE the top figure in a raw-fur price list is the coveted prize of every trapper, fur buyers and graders know that a considerable portion of each season's catch of otherwise prime pelts must be devalued simply because of carelessness in the initial steps of skinning and curing each individual pelt to make it bring the highest market price. Care in preparing the skin begins at the time the animal is taken from the trap and continues until the pelt is packed for shipment. Many trappers with long trap lines skin each animal as soon as it is removed from the trap. Others prefer to wash and brush the fur before skinning, hence carry the catch to the fur loft where the animals are skinned and the pelts scraped and stretched all in one operation.

In many localities, weed and bramble patches are the habitat of certain fur bearers that obtain their food on dry land. In the fall burrs and seed pods get into the fur of these animals and should be combed out before skinning them. A discarded hairbrush, Fig. 4, can be used to

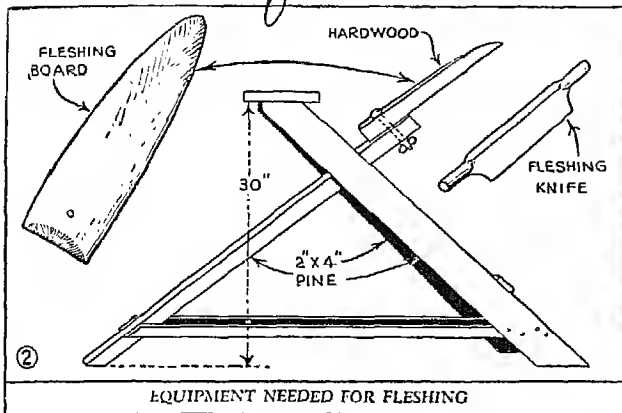
advantage, as it straightens the fur and leaves it sleek and shiny. Animals trapped along creeks and river banks saturate their fur with mud and sand when trying to escape. These pelts are most readily cleaned by washing in lukewarm water. Dry thoroughly and brush the fur before skinning.

The "cased" and "open" methods of removing the pelt from the carcass are accepted by fur buyers as standard with certain fur bearers. See Fig. 1. Like pulling your glove off wrong side out is a good description of the cased method. First, lay the animal on its back and with a sharp knife, Fig. 5, cut around the paw pads of the hind feet and slit down the back of the hind legs to the vent. This is the opening cut, Fig. 6. Now, suspend the carcass by

means of a skinning gambrel at a convenient working height and carefully work the pelt down over the carcass, cutting the tissues loose with your knife where necessary, Fig. 7. Cut the pelt loose at the base of the tail on muskrat, opossum, and beaver. On others the tail bone should be skinned out. A neat job can be done

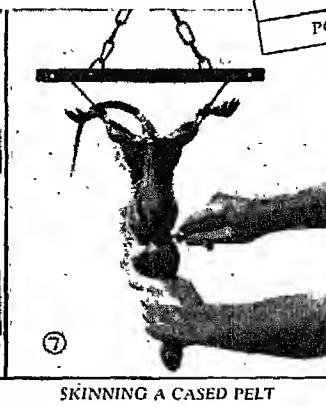
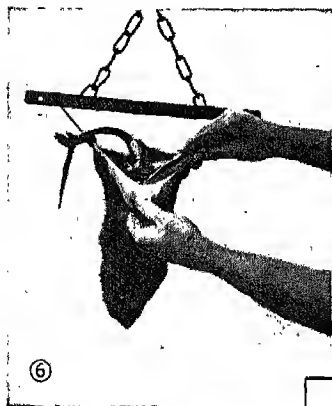
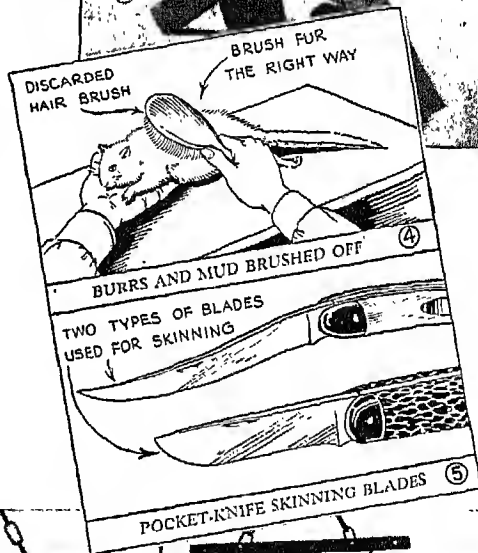


FURS *for* MARKET

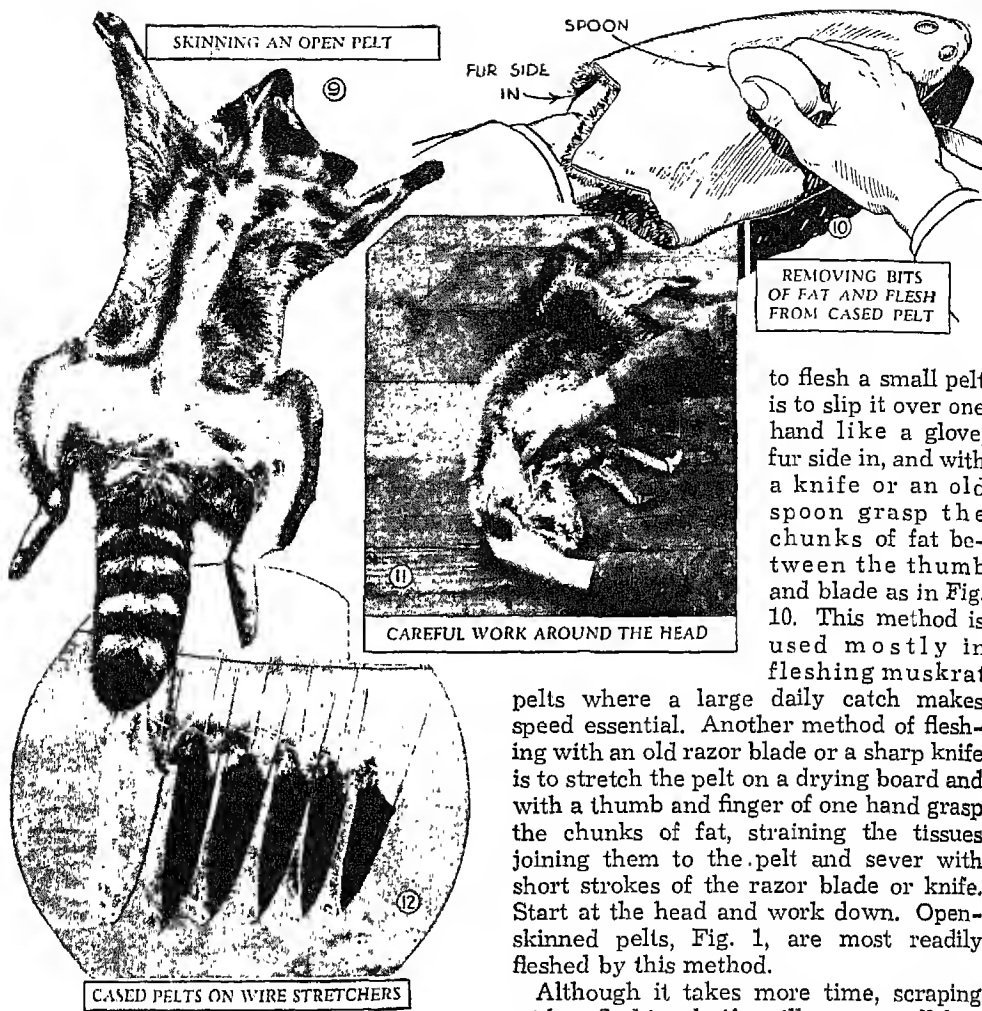


by inserting an umbrella rib or a short length of stiff wire on the underside between the skin and tailbone to serve as a guide for the point of the knife. Skin out the front legs with a direct pull as in Fig. 8. Use care in skinning out the head, working very close to the skull and cutting loose the eyes and ears, Fig. 11. The pelt is very thin at this point and tears easily so don't try to hasten the job by a vigorous pull. Skin with your knife to the tip of the nose.

Remove pelts by the cased method on the following animals: Muskrat, mink, skunk, opossum, ermine, fox, wolf, lynx, civet cat, coyote, marten, fisher, otter, lynx cat, and wolverine. Raccoon, badger, wild cat, beaver, and bear are open skinned.



SKINNING A CASED PELT



Skinning by the latter method, you slit down the back of the hind legs to the vent and cut the pelt open from the point of the chin to the end of the tail down the center of the belly as in Fig. 9. Cut around the paw pads and slit down the inside of the front legs. Then carefully skin the pelt from the carcass. Skin beaver as cleanly as possible as the pelt is very difficult to flesh.

Fleshing the pelt after skinning is always necessary as it is practically impossible to remove the pelt without some of the fat and flesh clinging to it. If this is not removed it may cause spoilage or improper curing of the skin, resulting in the hair falling out. One of the quickest ways

to flesh a small pelt is to slip it over one hand like a glove, fur side in, and with a knife or an old spoon grasp the chunks of fat between the thumb and blade as in Fig. 10. This method is used mostly in fleshing muskrat

pelts where a large daily catch makes speed essential. Another method of fleshing with an old razor blade or a sharp knife is to stretch the pelt on a drying board and with a thumb and finger of one hand grasp the chunks of fat, straining the tissues joining them to the pelt and sever with short strokes of the razor blade or knife. Start at the head and work down. Open-skinned pelts, Fig. 1, are most readily fleshed by this method.

Although it takes more time, scraping with a fleshing knife will remove all bits of fat and flesh without the danger of cutting holes in the pelt. Equipment used in this method is shown in Figs. 2 and 3. The fleshing boards are made up in various sizes, the fur bearers in your locality governing the dimensions and contour of the boards. They should be made from 2-in. stock to permit rounding the side against which the scraping is done. The working face is planed and the ridges sanded smooth. Make the hardwood fleshing knife, Fig. 2, sufficiently large to grasp firmly in both hands, and plane it to a sharp edge.

To use, pull or drape the pelt on the fleshing board, skin side out, working only against the rounded portion and turning the pelt as you scrape from the head down. Scraping too hard will loosen the hair

roots. Use just enough pressure to work the excess fat from the skin. Clean, dry sawdust sprinkled on the pelt absorbs much of the oil squeezed from the fat while scraping. Continue the scraping until all bits of fat and flesh have been removed, then wash the skin with a non-caustic soap and lukewarm water.

When the water has dried from the fur, the skin should be stretched immediately. Spring-steel wire stretchers for the smaller cased pelts, Fig. 12, are generally recommended. They have a tension to properly stretch all sizes of pelts for which they are intended, and allow circulation of air for better curing. When making your own stretching boards for cased pelts, a smooth symmetrical shape is the thing. Irregular or overstretching will thin pelts, causing the hair to fall out. Shape pelt-drying boards to take up slack in all directions.

In stretching, drape the pelt on the board with the belly on one side and the back on the other, centering the front feet

openings an equal distance from each side. Tack the skin at the butt end after pulling up the slack. The following list of pelts should be stretched and dried skin side out: Muskrat, skunk, opossum, mink, civet cat, otter, ringtail cat, and weasel. To prevent sticking, which makes it almost impossible to remove the skin from the stretcher, pelts of the wolf, coyote, fox, lynx, marten, fisher and wolverine should be placed first on the board flesh side out and allowed to dry a few days. Then, when the flesh side ceases to be tacky, reverse the pelt on the board and complete curing.

Stretch an open-skinned pelt by tacking to the side of a building, Fig. 1, or, if there is danger from rodents, make a panel of boards and hang it from the rafters. Get a square effect on raccoon and badger. Tack fur side in for better curing. Lace beaver skins on the inside of a wire hoop. Gradually stretch by lacing cord through the edge of the pelt and around the hoop, Fig. 1. Hang in a cool, dry place.

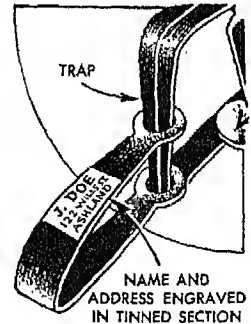
Red Ribbon Tied to Fishing Fly Will Attract Frogs



Many fishermen use a long, limber cane pole and a light line to reach over into the lily pads and moss when fishing for frogs. With this setup, a trout fly makes an ideal lure, and if a short piece of red ribbon or wool yarn is tied to the bait so the ends hang down over the fly, it will prove more attractive. Some fishermen use just the ribbon or yarn tied to an ordinary hook.

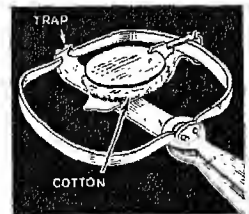
Name Engraved in Tin Plating Identifies Steel Traps

As a means of identification, one trapper tinned a small portion of the spring on each of his traps and engraved his name and address in the plating with a nail. With ordinary use, the inscription will last indefinitely.

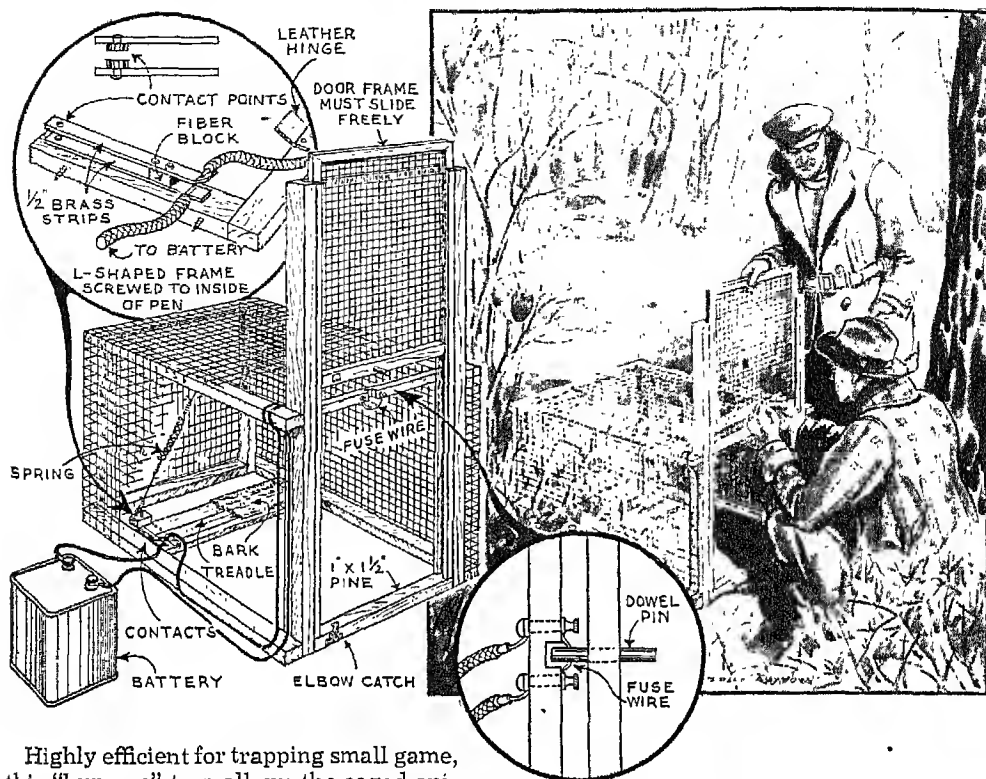


Cotton Wad Under Pan of Trap Aids in Quick Tripping

When making dry-land sets where a steel trap is to be covered with loose soil, leaves, or other fine material, the covering is likely to work under the pan of the trap and prevent its closing when tripped. To avoid this, one trapper places a piece of loosely wadded cotton under the pan as indicated. This allows the trap to spring easily under the animal's weight.



This Small-Game Trap Is Sprung Electrically



Highly efficient for trapping small game, this "humane" trap allows the caged animal to move about, permits the "catch" to be observed and studied closely and to be released without handling if desired. Here is how the trap is sprung: The animal, when within the trap, must step upon a critically adjusted treadle to reach the bait which is placed on the floor at the far end of the cage. Movement of the treadle produces an electrical contact which melts the fuse wire supporting the raised trap door, allowing the latter to drop. Although pine can be used, hardwood is best for the framework, which is covered completely,

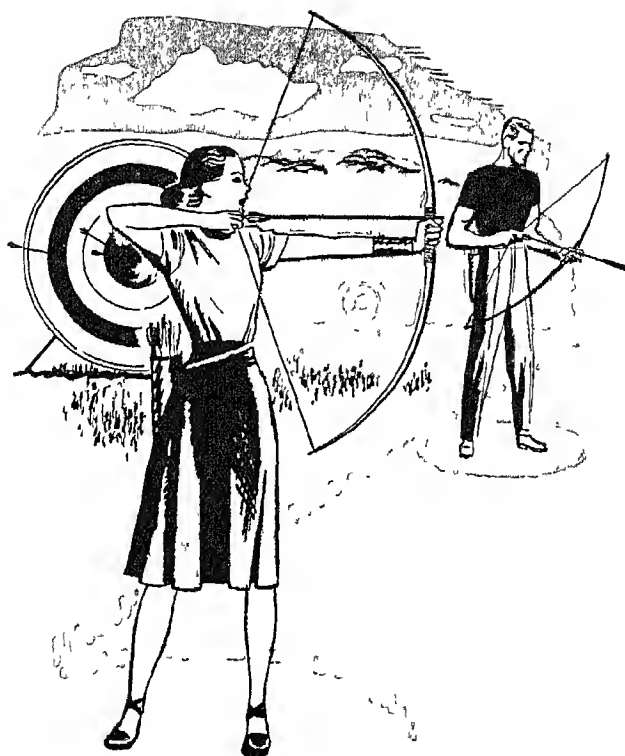
including the bottom, with suitable wire mesh. The upper circular detail shows how the contacts are attached to an inner L-shaped frame to which the treadle is hinged. A small block, to which a light spring is attached to hold the circuit open, is fitted to the treadle to overhang the edge directly above the contacts. Use 32-ga. iron wire for the fuse wire, and several dry cells or a storage battery for the power. Wax the ways in which door slides so that it will operate smoothly.

Method for Preparing Rawhide From Pelts

To make rawhide from the pelt of an animal, soak the pelt in a pail or tub of water to which a few handfuls of wood ashes have been added. Let it soak for several days, or until the hair comes off easily. Using a dull-edged tool such as a skate blade or the edge of a file, scrape off all the hair so that the pelt is clean. Then turn over the pelt and "flesh" it by scraping off all the fat until it is white and uniform in

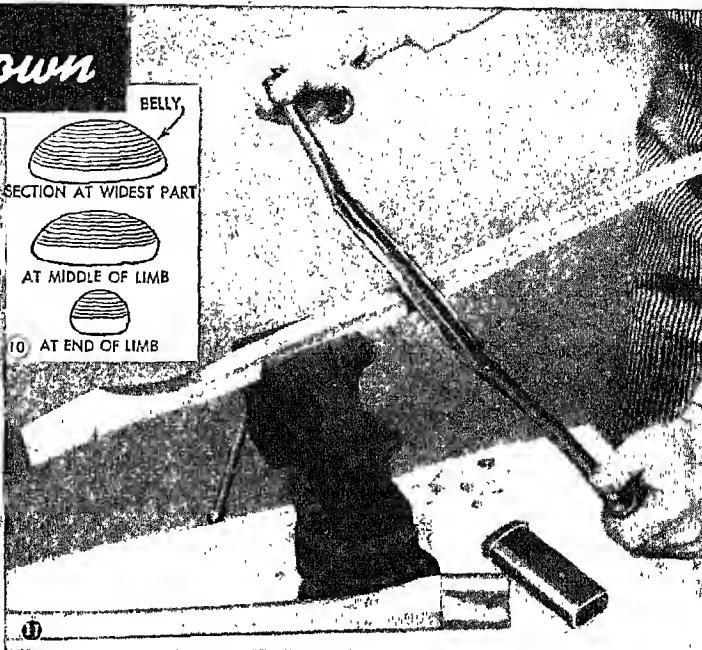
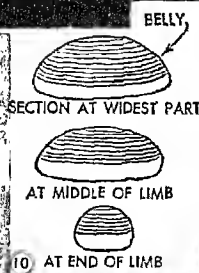
thickness. During the scraping operation rub in dry sawdust or cornmeal to help absorb the fat. After scraping, stretch the hide and tack it to a flat surface in a shady place away from flies. When thoroughly dry, the hide is softened by rubbing in a mixture consisting of equal parts of tallow and neat's-foot oil. To finish the rawhide, work the skin back and forth over the edge of a board until it is soft and pliable.

PART V



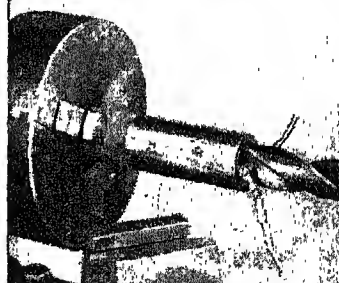
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'em Down

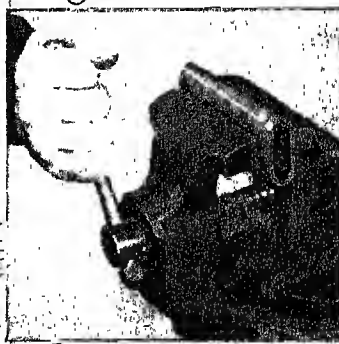


The drawing weight need not be excessive; you can bring down the toughest game in the country, including moose, bear and wild boar, with a 45 to 50-lb. bow and a steel broadhead arrow. Most hunters prefer a flat or semiflat bow. The demountable type of semiflat bow described here is popular because of ease of transportation, and the knockdown handle in no way affects smooth, fast shooting. If this is your first bow, by all means make it of lemonwood, as this compact and nearly grainless wood permits mechanical shaping without any regard to grain structure. If you want the best, however, use osage orange or boam. Yew is good, too, although a little too soft for rough usage. All bow woods except lemonwood require careful following of the grain.

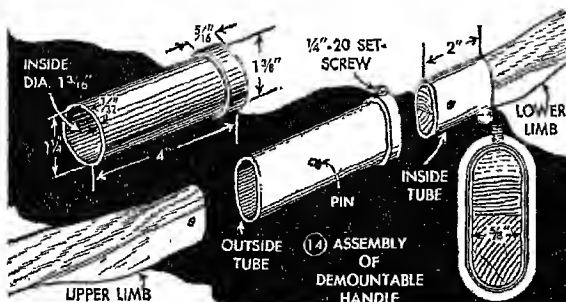
Start by roughing out the back of the bow. Osage orange is perfect in this respect; just peel off the bark, and the remaining layer of sapwood, about $\frac{3}{16}$ in. thick, is just right. Yew and boam have more sapwood and will require trimming down. This can be done best on a band saw as in Figs. 1 and 2, mounting the stave on a guide board and then saw-



12 BORING THE HANDLE TUBE

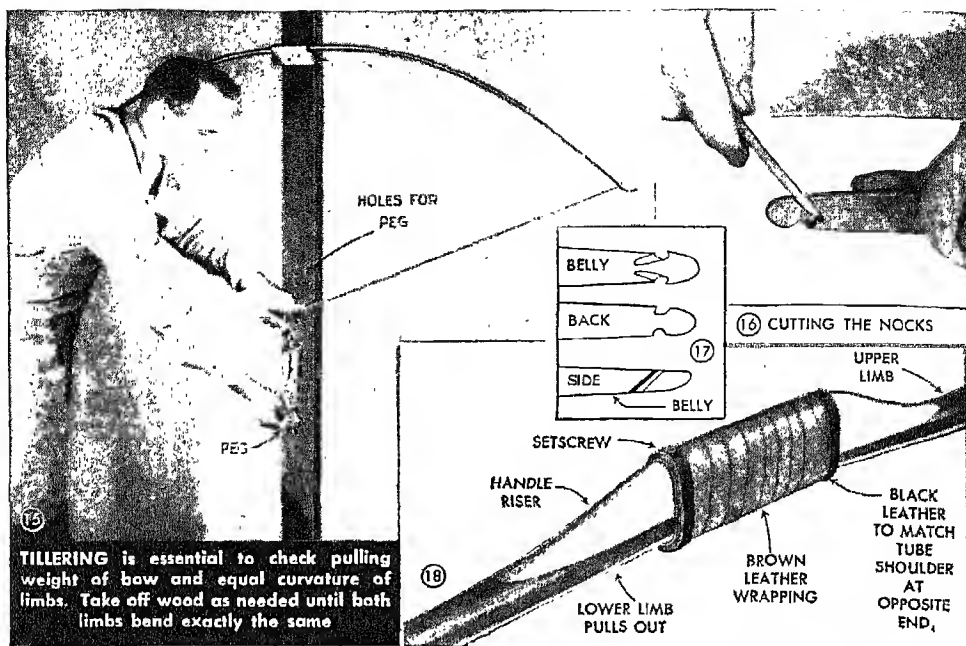


13 VISE PRESSURE GIVES OVAL SHAPE



14 ASSEMBLY OF DEMOUNTABLE HANDLE

THE HUNTING BOW should be as short as practical, with pulling weight of 40-60 lbs. Style shown is semi-flat, with demountable handle for ease in transportation



ing on a line the required distance away from the heartwood. Pins holding the stave should be a snug drive fit in holes drilled squarely across the chord of the grain, as indicated in Fig. 1. If there is too much heartwood, it can be trimmed down with the same setup. Where there is just a little extra wood on the heart side, a planer head in the drill press will remove it in a jiffy, Fig. 3. In the absence of power tools, the staves can be trimmed with a drawknife. The first stage of cutting gives you a flat stick about $\frac{3}{4}$ by $1\frac{1}{2}$ in. with a thin layer of white sapwood on the back as shown in Fig. 5. Here you can see why it is easy to work with lemonwood; you have no sapwood to worry about, and the compact grain permits ripping and jointing to straight lines. All the other woods will be crooked, the back of the bow following every dip and curve in the grain. After band-sawing, smooth up the back of the bow with drawknife and scraper, following the grain. Fig. 4 shows table of net sizes for bows of different woods.

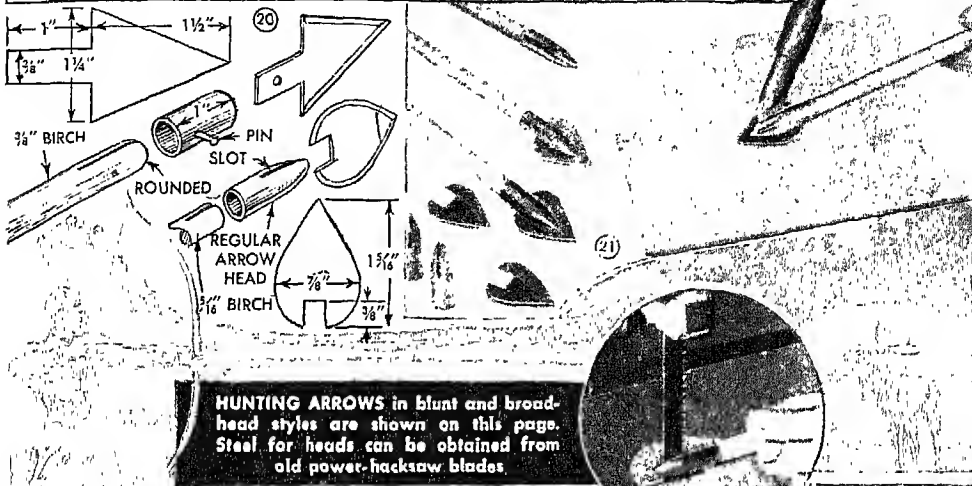
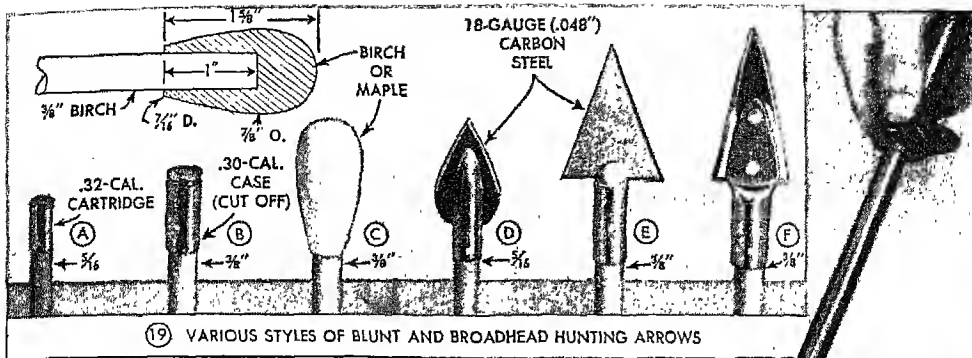
On the back of the stave, draw the outline shown in Fig. 5, band-saw to shape and taper the belly side as in Fig. 6. You will cut across the grain to some extent in both operations, but it is only on the back of bow that you positively must follow the grain. Glue the handle riser in place, Fig. 8, and then band-saw it both ways to the shape shown in Fig. 7. Both limbs of the bow are treated in the same way except that the upper limb should be 2

in. longer than the lower one, as in Fig. 9.

The demountable feature is accomplished by fitting the limbs of the bow inside a metal tube. You can buy telescoping tubes for this purpose, or you can make your own. Fig. 14 shows the general nature of the assembly. The short inside tube is pinned to the lower limb and the long outer tube is pinned solidly to the upper limb, the lower limb being a slide fit inside the outer tube, where it is held rigidly by means of a setscrew. Making your own telescoping tube is just a matter of turning and boring, Fig. 12, and then squeezing the assembled tubes in a vise as in Fig. 13, to get the required oval section. It is advisable to heat the work, otherwise the steel may crack at the shoulder portion. The original fit of the round tubes should not be too snug.

Figs. 10 and 11 show the final stage of shaping the bow, rounding off the belly with a drawknife or coarse and fine rasps. Osage orange may be so knotty as to require entire shaping by filing. Whenever you run into a knot, leave a little extra wood to compensate for the natural weakness caused by the defect. Finish off the limbs by scraping with a hook scraper or a piece of broken glass.

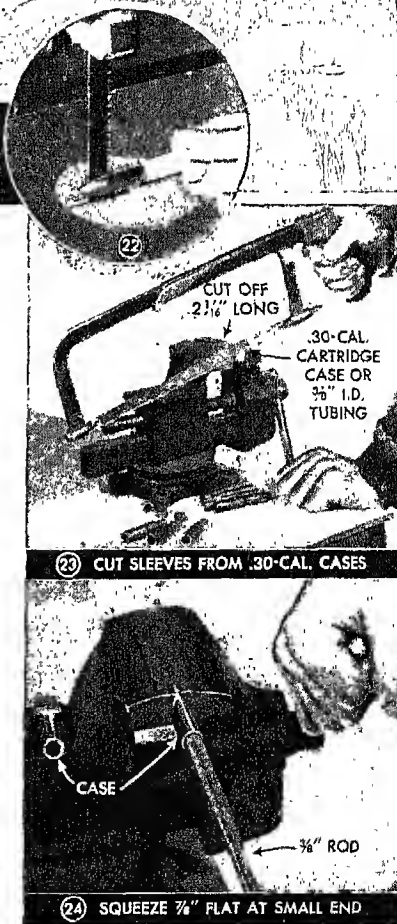
As you work down the belly side, tiller the bow frequently as shown in Fig. 15, checking its drawing weight, and more important, the bend of the limbs. Some workers tiller against a wall and use a grid of pencil lines to check for equal bending.

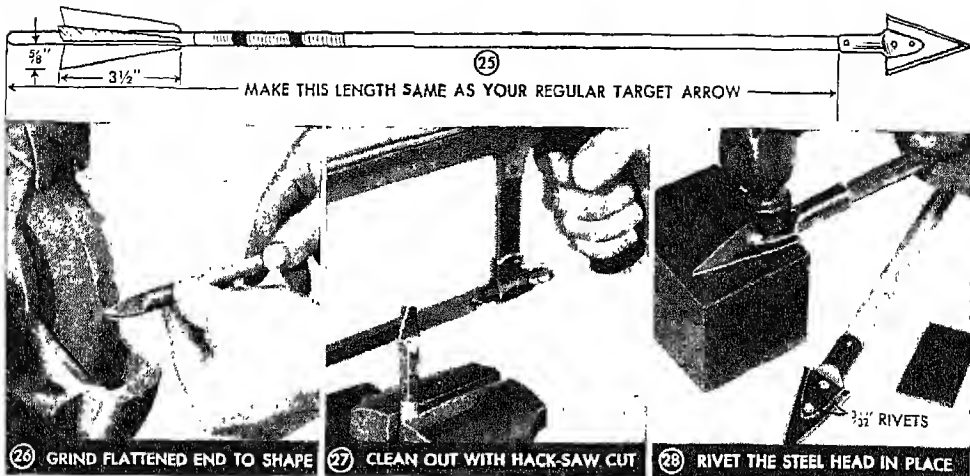


However, good results can be obtained by eye inspection alone, and by noting if the string tends to pull off to one side as you pull it back. The bow should be rigid through the handle, and almost rigid the full length of the handle riser. Starting at the end of the handle riser, the limbs should bend in a graceful arc. Go slow at this stage; it is very easy to remove too much wood and ruin the bow. If you get a little under the poundage you want, cut an inch off both limbs and try it again. Get the pull about 5 lbs. more than you want; it will let down about that much after you have used it a few hours. If the bow is much too heavy throughout, make a fast dip immediately beyond the handle riser to get a thinner section, and then taper gradually to the tips. Nocks should be of the plain type cut into the wood as in Figs. 16 and 17. Fig. 18 shows the finished bow at the handle.

There are two kinds of hunting arrows: blunts and broadheads. The blunt points, details A, B and C of Fig. 19, can be made from cartridge cases or turned from wood. These heads have tremendous hitting power. They will bowl over a rabbit or knock a squirrel out of a tree. The need for the blunt point is obvious; you can imagine what happens to a sharp steel broadhead when you wham it into a tree trunk, or worse, a high tree limb.

Steel broadheads are needed for both small and big game. With sharp-cutting edges, even a 40-lb.

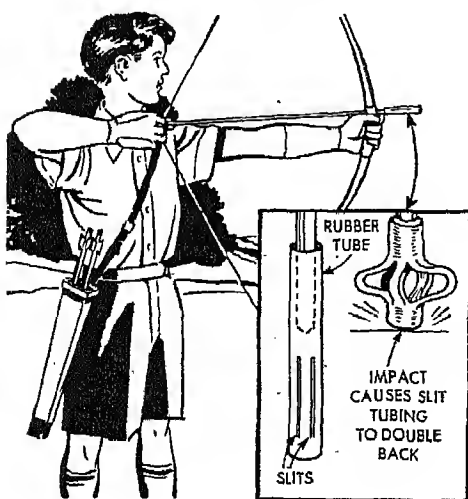




bow will send one of these shafts right through a two-point buck. The smallest practical head is the lancet shown at D, Fig. 19. This is made by slotting a regular bullet-type arrow head, and then soldering the notched steel head into the slot as in Figs. 20, 21 and 22. Easiest type to make in any size of broadhead is the tang-and-sleeve style shown at E and explained in Fig. 20. The step-by-step operation in making a broadhead, style F, is shown in Figs. 23 to 28. If you use .30-cal. ball cartridge cases, it will be necessary to have a tang on the broadhead for needed strength. With a sleeve of thicker copper or steel tubing, the split ends of tube alone will hold the head, which can be made a simple,

triangular shape without tang. Old power hacksaw blades furnish good steel for heads. All of the styles shown can be purchased readymade if desired. Fletching of shafts follows standard practice except that the feathers are preferably of the low, long triangular style as shown in Fig. 25. Complete construction kits including heads, cut feathers and birch shafts can be purchased at a nominal cost and provide an ideal method of working. The diameter of shafts will depend somewhat on the pull of your bow. If the pull is 40 lbs. or under, $\frac{5}{16}$ or $\frac{11}{32}$ -in. shafts are plenty heavy. Bows pulling over 45 lbs., especially when big broadheads are used, must have $\frac{3}{8}$ -in. shafts to stand up under the terrific impact.

Slit Tubing Over Point of Arrow Lessens Danger to Others

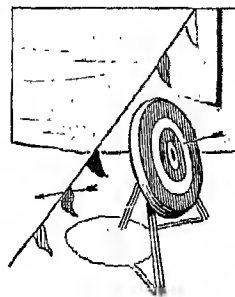


To shorten the range of arrows and minimize the danger to others, one parent puts a protective head on the arrows of his

son's archery set. The head consists of a length of rubber tubing with 5 slits about 1 in. long. These heads are slipped over the points and serve to break the impact when the arrow hits an object.

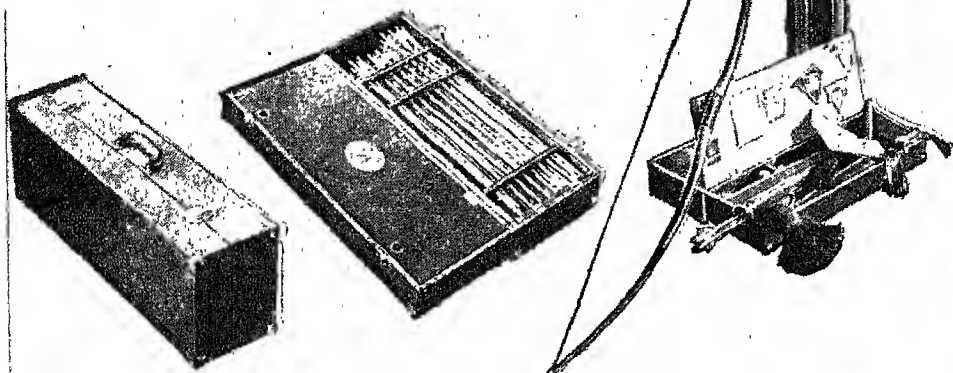
Colored Pennants Help Locate Lost Archery Arrows

As an aid in noting the path of archery arrows that miss the target, one instructor attaches pennants of different colored cloth to a string, which is then stretched between stakes placed to one side and slightly behind the target. By noting the color of the pennant in the path of the arrow, an archer can follow the line of flight easily.



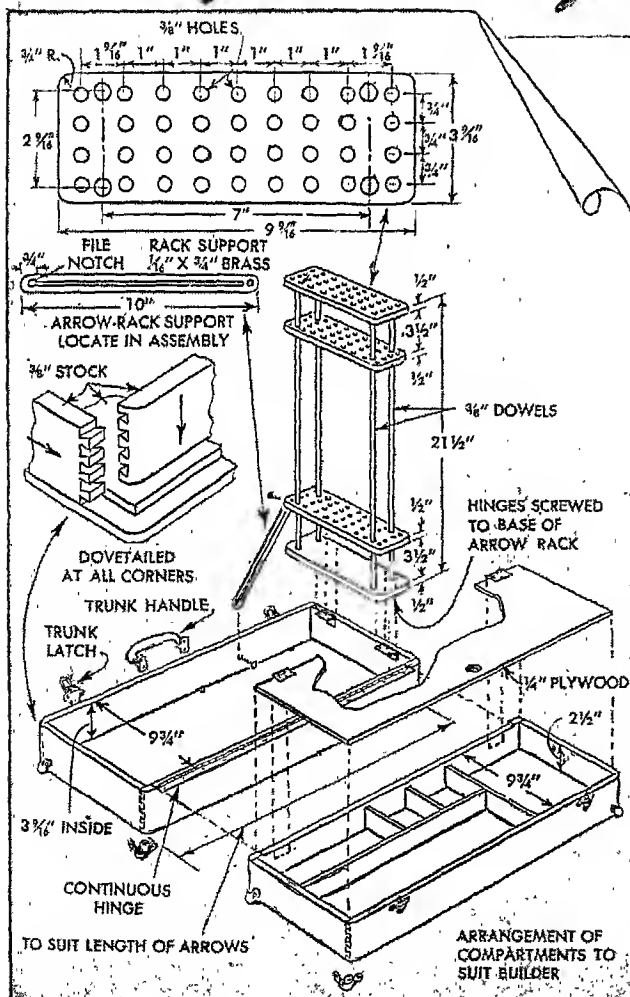
Archery Tackle Box

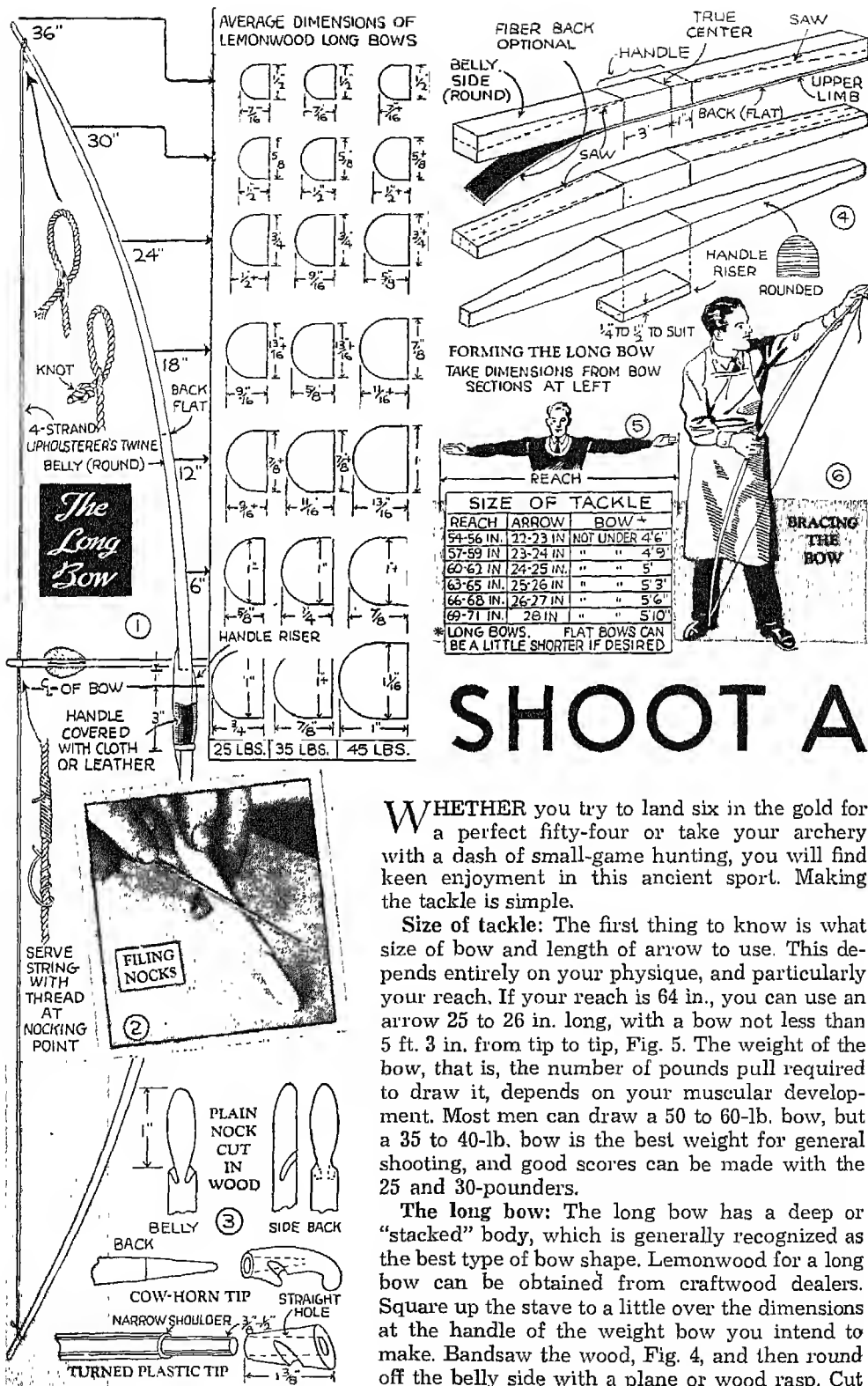
Compact and easy to carry, this archery tackle box has space for almost everything that's needed in the field. Compartments can be arranged to suit your convenience



By Kenneth B. Wikel

IF THE over-all dimensions shown on the drawing are followed, one half of this archery tackle box will have space enough for 36 arrows and the other half can be divided into compartments to carry such necessities as arm guards, gloves, string wax, repair thread and other items that are a part of every archer's kit. The corners are dovetailed and the two sidepieces are rabbeted for a close fit. Arrangement of the compartments is made to suit your own requirements. The dividing section fits into the half that contains the compartments and has a finger hole reinforced with a metal grommet. Construction of the rack for the arrows is shown in the upper and right-center details. Notice that the metal arrow-rack support is fitted after the rack is completed and hinged to the box. After the two halves of the box are joined with a continuous or piano-type hinge, all corners are rounded and fitted with metal reinforcements. The handle and latches are of the type used for trunks.



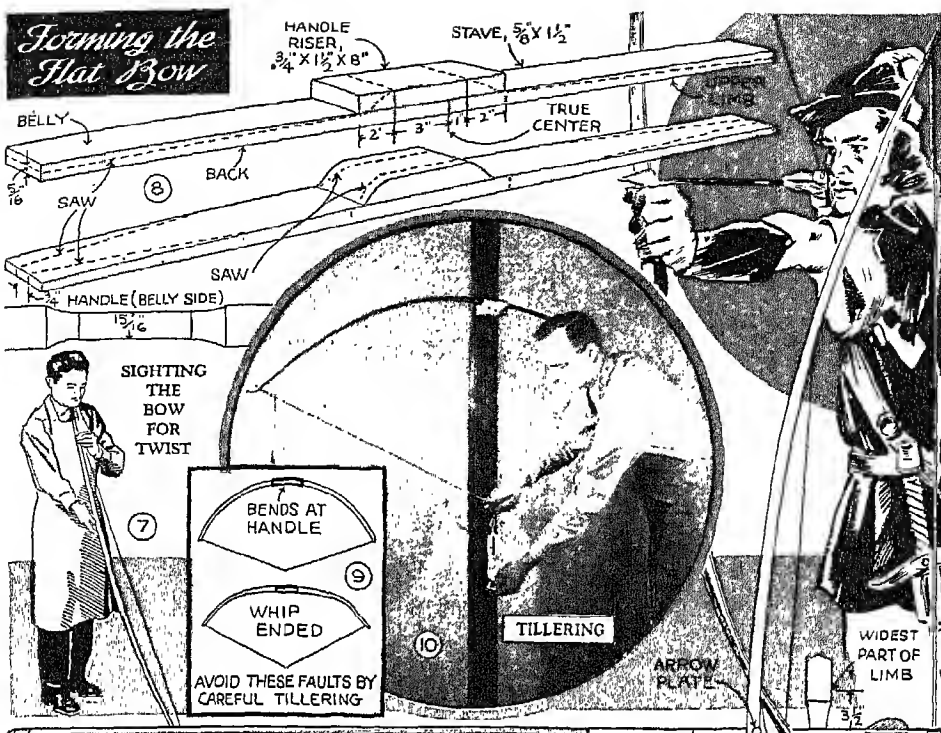


SHOOT A

WHETHER you try to land six in the gold for a perfect fifty-four or take your archery with a dash of small-game hunting, you will find keen enjoyment in this ancient sport. Making the tackle is simple.

Size of tackle: The first thing to know is what size of bow and length of arrow to use. This depends entirely on your physique, and particularly your reach. If your reach is 64 in., you can use an arrow 25 to 26 in. long, with a bow not less than 5 ft. 3 in. from tip to tip, Fig. 5. The weight of the bow, that is, the number of pounds pull required to draw it, depends on your muscular development. Most men can draw a 50 to 60-lb. bow, but a 35 to 40-lb. bow is the best weight for general shooting, and good scores can be made with the 25 and 30-pounders.

The long bow: The long bow has a deep or "stacked" body, which is generally recognized as the best type of bow shape. Lemonwood for a long bow can be obtained from craftwood dealers. Square up the stave to a little over the dimensions at the handle of the weight bow you intend to make. Bandsaw the wood, Fig. 4, and then round off the belly side with a plane or wood rasp. Cut

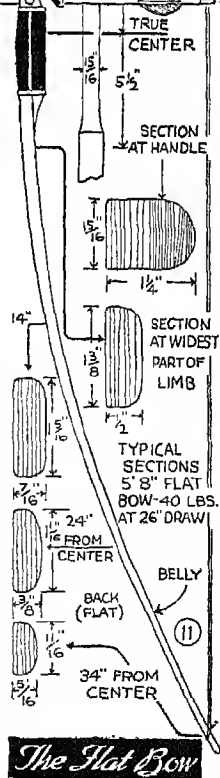


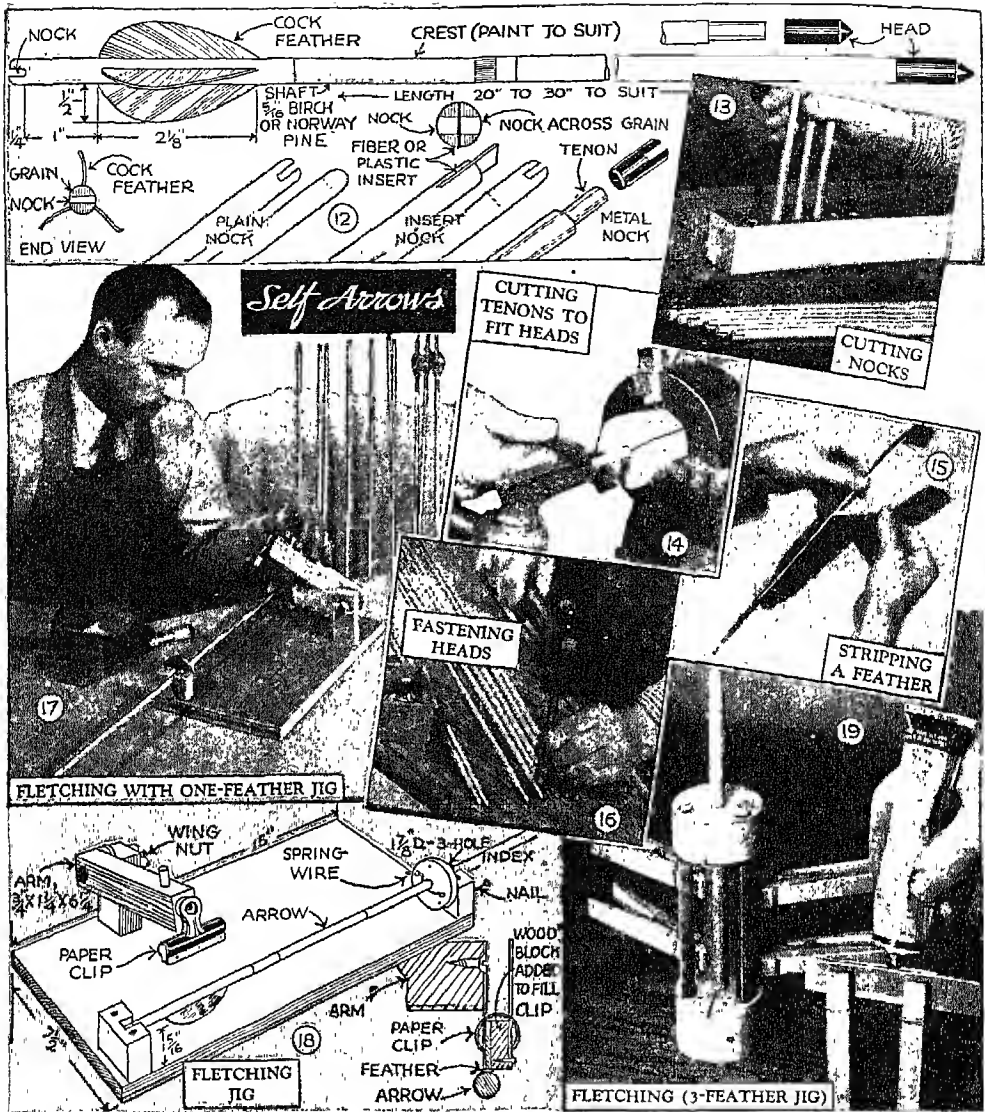
BOW FOR FUN

the nocks 1 in. from each end, Fig. 3, using a round file, Fig. 2. Make a bowstring from upholsterer's twine, as shown in Fig. 1, and brace the bow as in Fig. 6. When the bow is braced the height of the string from the center of the bow should be about equal to the width of the hand and thumb with the latter stuck out as in Fig. 28. You can now "tiller" it to check the bend of both limbs, at the same time measuring the weight with a spring scale, as shown in Fig. 10. Bend the bow gradually. Take off a shaving here and there to equalize the bend. Take your time. You can always take off more wood, but you can't put it back on again. The bow should be quite stiff for a distance of about 6 in. at the center, and should then curve evenly to the tips. The beginner's most common fault is to make the bow "whip ended," Fig. 9. Besides checking the curvature, sight down the bow as you work and note if the string cuts the center of the belly, as in Fig. 7. If it throws off to the side, your bow has a turn in it. This can be corrected by taking off wood opposite the turn.

If desired, you can back your bow with red or black fiber attached with waterproof glue before the shaping is started. Instead of cutting plain nocks, you may decide to purchase and fit a set of cow-horn tips, or, you may want to turn them from colorful plastic. It will be noted, Fig. 3, that plain nocks are not cut across the back of the bow as this would weaken the wood. The groove in horn or plastic tips, however, is let into the back.

The flat bow: The flat bow is easier to make than the long one

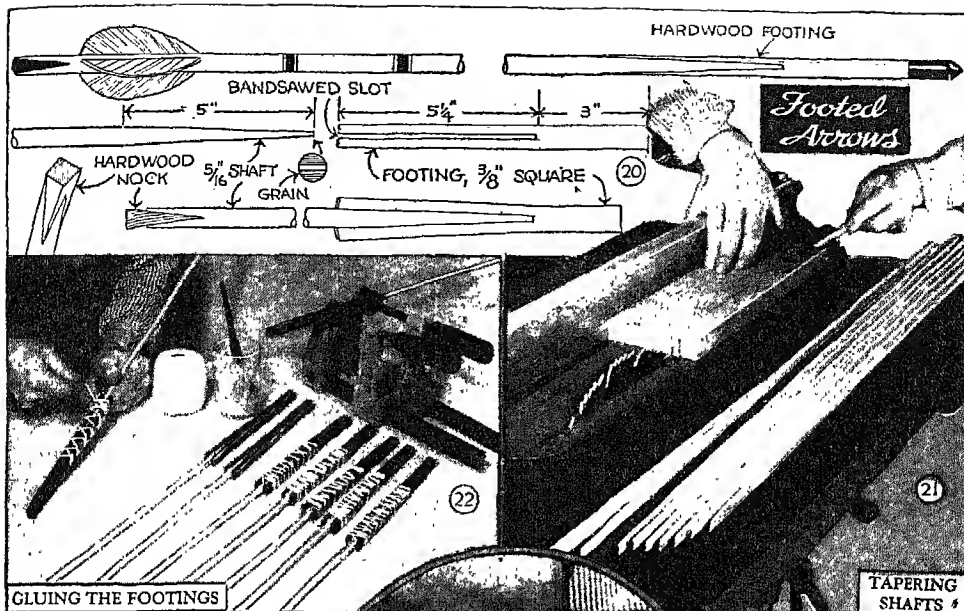




and can be 3 or 4 in. shorter for the same length arrow. The same general method of bandsawing is used, Fig. 8, but the belly side is only lightly rounded off. Typical sections of a 40-lb. flat bow are given in Fig. 11. The handle riser can be the same or of a contrasting wood to the bow itself. The narrow plate, which prevents wear, is inlaid, using a $\frac{1}{16}$ -in. disk of $\frac{1}{8}$ -in. plastic.

Self arrows: A "self" arrow is one made from a single piece of wood. The simplest way to make self arrows is to buy a construction kit, which includes the $\frac{1}{16}$ -in. dowel sticks, feathers and heads. Birch is the best wood to use. The various parts and dimensions of the arrow are shown in

Fig. 12. First put on the head. A number of different ones can be purchased, but for average target work the brass parallel pile head is most satisfactory. Cut the tenon on the end of the shaft by turning on a lathe, Fig. 14. If you are careful, the head will be a drive fit and will hold securely. If the head is a bit loose, anchor it with a few punch taps as shown in Fig. 16. Cut the arrows to the required length and then cut the nocks. Plain nocks can be cut easily by running the shafts over a circular saw, as in Fig. 13. The nock should be across the grain. If you want more strength at the nock, insert a thin slip of fiber or plastic. Aluminum or molded-plastic nocks are

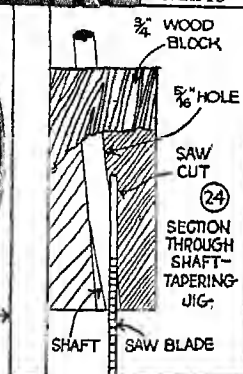
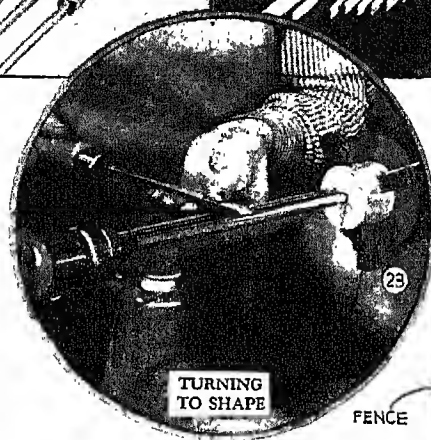


very attractive and are fitted by tenoning the end of the shaft the same as in fitting the head.

Fletching is the hard part of arrow making. However, if you use one of the jigs shown in Figs. 17 and 19, you will be able to turn out good work at a fair rate of speed. Turkey feathers can be purchased already cut, or you can strip your own feathers by grasping the vane at the tip and pulling outward, as shown in Fig. 15, afterward cutting the vane to the required shape. The one-feather fletching jig shown in Figs. 17 and 18 is built around a paper clip. A disk of plywood, which slips over the shaft, is drilled with three small holes to supply an indexing head, and is prevented from slipping by means of a piece of spring wire. One feather at a time is clamped by the paper clip and pressed into position. Any type of adhesive can be used. Celluloid cement has the advantage of quick drying and the ability to anchor on lacquer, thus allowing the shafts to be painted previous to fletching. Waterproof glue on bare wood is the most durable. In the three-feather jig, the feathers are held between metal plates, one plate of each set fitting into grooves in

the top and bottom members. The upper ring is removable, being a press fit over the three spacing dowels.

Footed arrows: Footed arrows are more decorative and more durable than self arrows. The footing is made from any tough hardwood, and is slotted for a distance of 5½ in., Fig. 20. Shafts are usually Port Orford cedar or Norway pine, and are tapered to fit the slot in the footing. Perfect tapering of the shafts can be done by the circular-saw method shown in Figs. 21 and 24. The taper should be made with the flat of the grain. The shaft is assembled to the footing with waterproof glue and the assembly is then clamped or wrapped with twine or rubber strips as in Fig. 22. Other than a special tenoning jig, the best method of rounding the footing to match the rest of the shaft is by turning, Fig. 23. Nocks



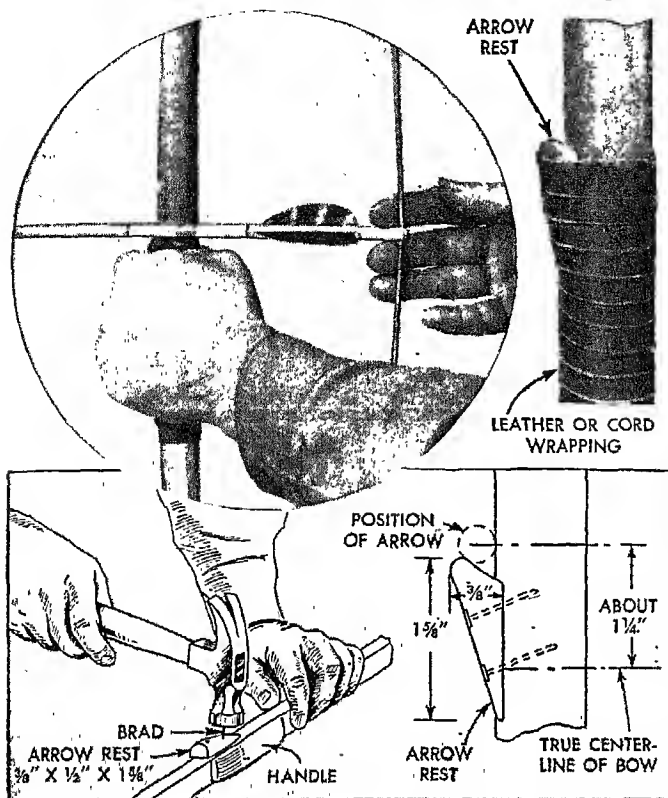


for footed arrows are usually of the same wood as used for the footing. The insert is let into the end of the shaft, and is later rounded off and grooved in the usual manner.

Accessories: If you want to be comfortable while shooting, you will need an arm guard and a finger protector. Any kind of leather band around the wrist and forearm will do for the guard, its purpose being to take the lash of the bowstring as the arrow is let loose. A simple finger tab of soft leather shaped as shown in Fig. 25 will provide protection for your fingers, or you may prefer to make or buy a three-finger shooting glove. An excellent target can be made by cementing four or five layers of corrugated cardboard together, painting the rings directly on the cardboard or on a piece of oilcloth. A simple target stand is made from 3/4-in. lumber, as shown in Fig. 27.

How to shoot: Stand with your feet well apart, left side facing the target, as shown in Figs. 26 and 29. Hold the bow horizontal and fit an arrow across the arrow plate. Grasp the arrow with the thumb or first finger of the left hand, Fig. 30, and with the right hand twirl the arrow until the cock feather is perpendicular to the bowstring. Adjust your grip on the string, as shown at the right in Fig. 25, and start the draw. Pull back slowly until your right hand comes to a fixed "anchor" point on your jawbone, Fig. 31. In this position, the string should be under and in line with the right eye. Aiming is done by sighting over the tip of the arrow to some fixed point previously determined as the correct point of aim at the distance being shot. Fig. 32 illustrates this method of aiming.

Rest on Bow Eliminates Danger of Feather Cuts

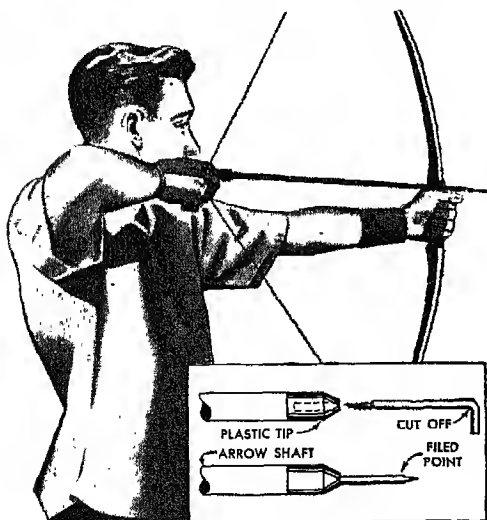


By fitting an arrow rest on the hand grip of an archery bow you can improve your aim as well as eliminate danger of the feathers on the arrow cutting your hand. The rest is a small piece of hardwood or plastic shaped to fit the side of the bow and nailed in place so that the arrow will rest about $1\frac{1}{4}$ in. above the true center-line of the bow. The illustrations show the rest fitted to an English or long bow, but it can be fitted to flat or semiflat bows just as well. The small brads used to hold the rest in place do not weaken the bow. A workmanlike job is done by wrapping the grip with leather or cord as shown. A short length of red thread wound around the bowstring at the nocking point will serve as a guide in nocking the arrow at the same angle for each shot.—Sam Brown, Marion, Ohio.

Metal Point on Plastic-Tipped Arrow Increases Penetration

If you have plastic-tipped arrows in your archery kit, deep-penetration points can be made for them with screw hooks similar

to the one illustrated. The end of the plastic tip is ground flat, center-punched and drilled to receive the screw. After the screw is fastened in the tip, the hook is cut off and a sharp point is filed on the flank. The adaptation is especially effective for light bows because of increased penetration when used against wooden objects or for hunting and also because the arrow will not tear a straw-backed target to pieces as quickly as will one with a broader head. With heavy bows a broader head is superior.—John L. Story, Fort Worth, Tex.



Woodchuck Trap Is Concealed By Log at Burrow Opening

Woodchucks, which are difficult to trap, can be caught if a log is placed before the entrance of the burrow some time before the trap is set. The animal becomes accustomed to the log and will jump over it to get out. Then a trap is placed on the side of the log away from the burrow opening so that the animal will jump into the trap.

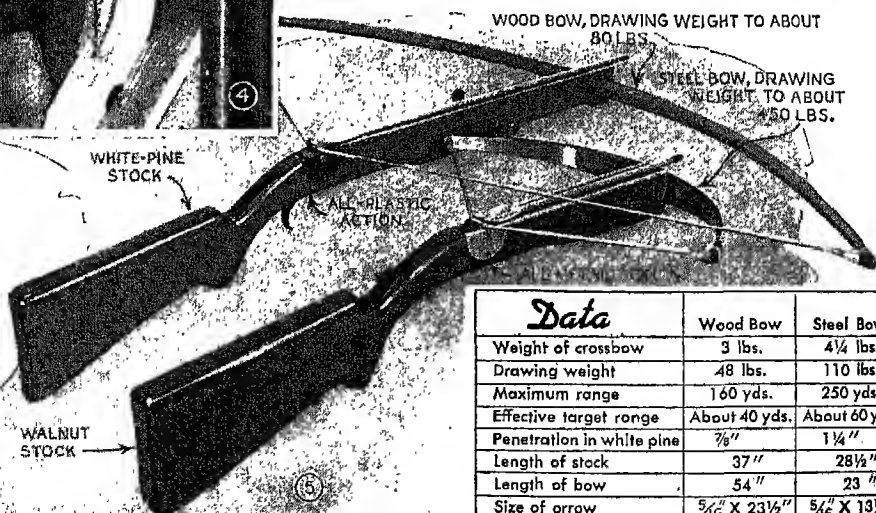


SHOOT THESE



IF YOU can't hit the bull's-eye with a regular archer's bow and arrow, try one of these modern crossbows and you'll find yourself hitting the "gold" almost every time from distances up to 60 yds. They are good for hunting, too; a 160-lb. steel bow will stop anything short of an elephant. Two models are described in this story, both very similar in construction except that one has a wood bow and the other a steel bow. Comparative data is given in table of Fig. 5.

Stock for wood bow: The stock of the wood bow can be made from white pine. Its shape is very much like a modern rifle as can be seen in Fig. 8. Start the job by making a full-size drawing of the stock including the full detail at the trigger as shown in Fig. 9. Transfer the stock outline to 1 $\frac{1}{16}$ -in. white pine and saw it out. Drill the hole for the string release, using an expansive bit as in Fig. 2. Recesses on either side of the hole are run in with a straight shaper cutter, Fig. 3, the guide collar rubbing the hole. Lacking shaper equipment, the recesses can be cut with a router bit in a drill press. Fig. 4 shows the mortise for the



<i>Data</i>	Wood Bow	Steel Bow
Weight of crossbow	3 lbs.	4 $\frac{1}{4}$ lbs.
Drawing weight	48 lbs.	110 lbs.
Maximum range	160 yds.	250 yds.
Effective target range	About 40 yds.	About 60 yds.
Penetration in white pine	$\frac{7}{8}$ "	1 $\frac{1}{4}$ "
Length of stock	37"	28 $\frac{1}{2}$ "
Length of bow	54"	23"
Size of arrow	$\frac{5}{16}$ " X 23 $\frac{1}{2}$ "	$\frac{5}{16}$ " X 13 $\frac{1}{2}$ "

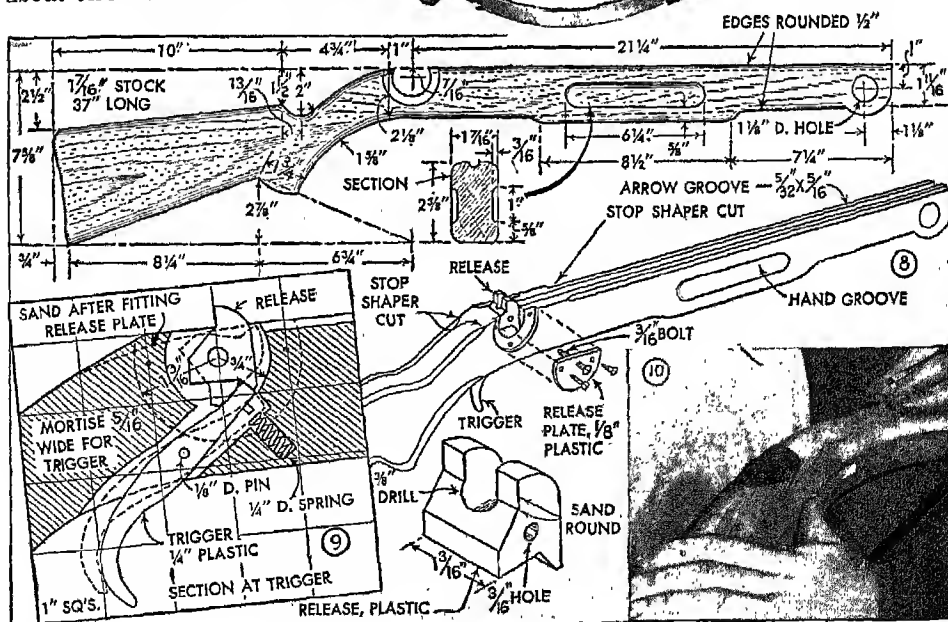


All working parts of the action are made from plastic. Dimensions given will provide sufficient strength for bows up to 60 lbs. drawing weight. Over this weight, the release plates should be $\frac{1}{16}$ -in. plastic and the trigger should be made from $\frac{1}{16}$ -in. metal. After fitting the release plates, the top of the stock is sanded down to about the dotted line shown in



Cocking lever

is required when bow pulls over 100 pounds. Bows that pull less than this weight can be set by hand



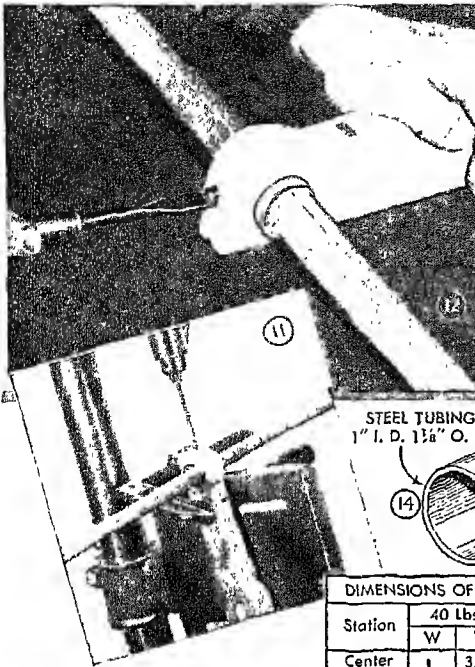
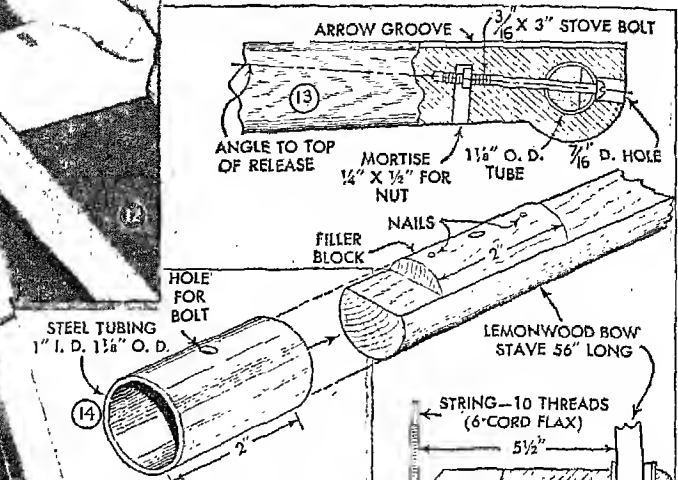


Fig. 9. Fig. 10 shows the operation. The sharp edges are then faired into the shaper cuts. Be careful in fitting the release plates so that screws will not interfere with this sanding and rounding operation, in other words, keep the two top screws low. The plastic trigger has a small lug on the underside near the upper end to fit inside the trigger spring, as can be seen in Fig. 9.

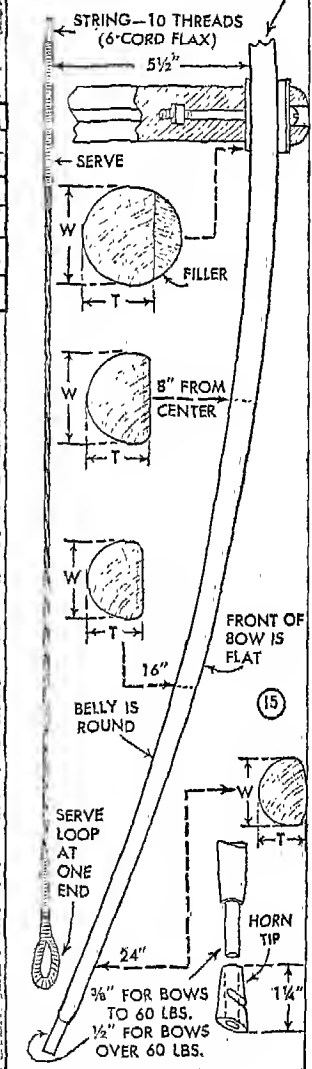
The wood bow: The bow is made of lemonwood to the approximate sections given in the table. The 60-lb. pulling weight is recommended. The 80-lb. bow is very close to the maximum stress which can be imposed on lemonwood in this length of bow. Shaping of the bow follows standard practice, flat on the front, round on the belly. A section 2 in. long at the center is made full round by adding a filler block, as shown in Fig. 14, this section being enclosed in a steel tube. The completed bow is fitted through the hole at the front of the stock and is fastened with a $\frac{3}{16}$ -in. bolt as shown in Figs. 11, 12, 13 and 15. Note in Fig. 13, that the bow is tilted slightly so that the string when pulled back comes to about the top of the string release. If desired, the bow can be made by trimming down a regular 6-ft. bow of about 30 lbs. drawing weight. When this is shortened and the ends trimmed down a little, it will pull about 60 lbs. at 21-in. draw. Equally practical, a flat bow can be used instead of the stacked type shown, mounting the bow in a notch cut at the end of the stock. In any case, the bow must be worked carefully and broken in gradually, tugging a little on the string and then releasing until the full draw is obtained.

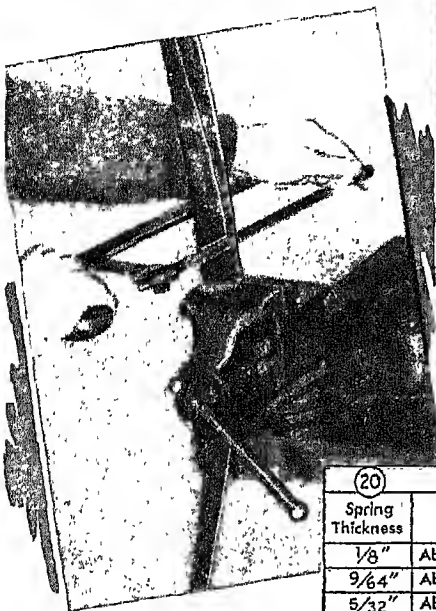
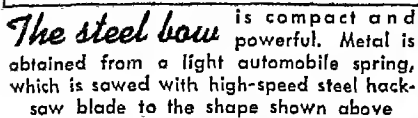
The steel bow: The steel bow, Fig. 1, does not have the silky, smooth shooting action of a good wood bow, and pound for pound the wood bow will outshoot it. Against this, the steel bow offers compactness and power, and, all

Wood bow is 54 inches long, made from lemonwood. Approximate section for 40, 60 and 80-lb. bows are given in table below. Bow is strengthened at center by steel sleeve



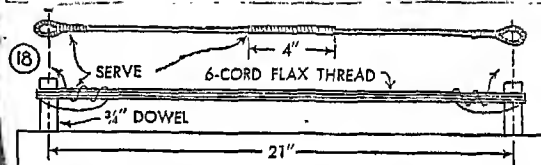
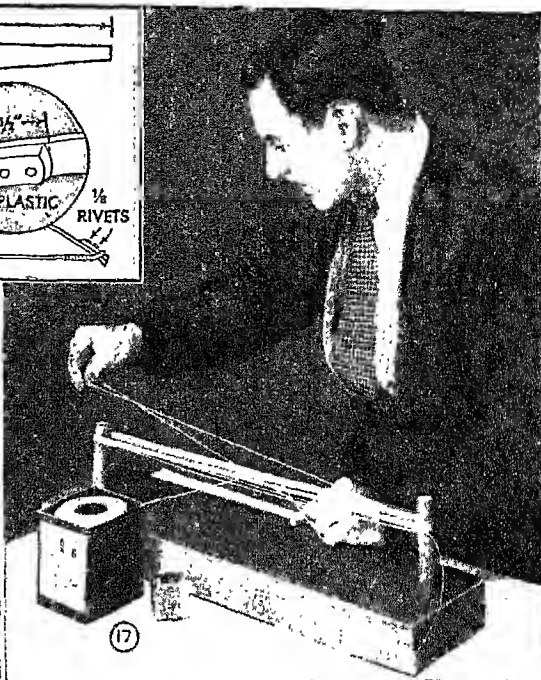
DIMENSIONS OF 54" LEMONWOOD BOWS						
Station	40 Lbs.		60 Lbs.		80 Lbs.	
	W	T	W	T	W	T
Center	1	$\frac{3}{4}$	1	$\frac{13}{16}$	$\frac{1}{16}$	$\frac{29}{32}$
8-Inch	$\frac{15}{16}$	$\frac{21}{32}$	$\frac{15}{16}$	$\frac{11}{16}$	1	$\frac{25}{32}$
16-Inch	$\frac{13}{16}$	$\frac{9}{16}$	$\frac{27}{32}$	$\frac{17}{32}$	$\frac{29}{32}$	$\frac{11}{16}$
24-Inch	$\frac{5}{8}$	$\frac{15}{32}$	$\frac{11}{16}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{9}{16}$





things considered, makes much the better cross-bow. The spring stock can be obtained from a light automobile leaf spring. It will cost you two high-speed steel hacksaw blades to saw it to shape, Fig. 19. If the spring is a little wider than needed, it is a good idea to leave the extra metal intact at the center, as shown in Fig. 16. The bow tips are cut from sheet plastic, riveted in place and filed to take the string. The steel bow will have an initial fixed set of about 2-in. deflection, and should be braced at 3½-in. deflection as shown in Fig. 16. The table, Fig. 20, shows approximately what leaf-spring steel will pull in pounds at 11½-in. draw. A 100 to 160-lb. bow is recommended. Extremely heavy bows over 300 lbs. drawing weight make nice exhibition pieces for flight or penetration shooting, but are no fun to shoot as you seldom retrieve the arrow intact if at all. It is prac-

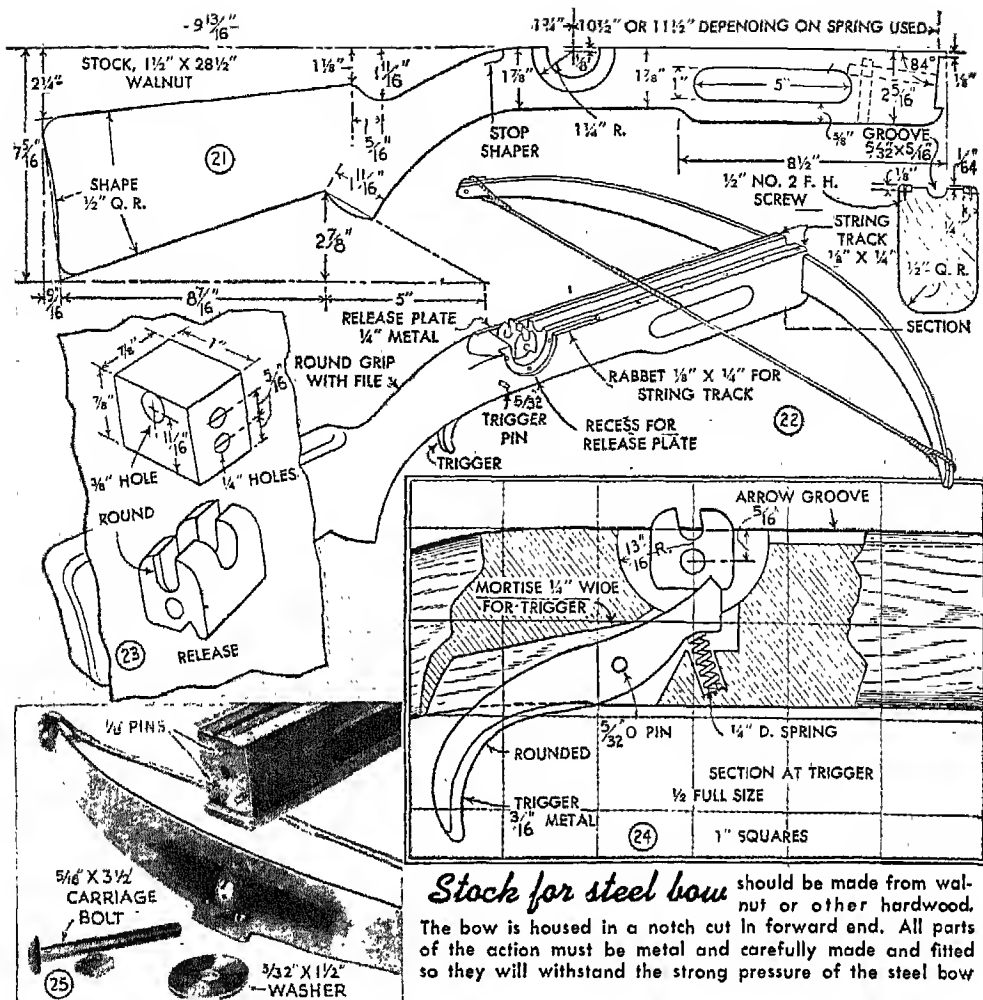
3/16"	About 21"
7/32"	About 2"
1/4"	About 2"



(20)		23-IN. SPRING-STEEL BOWS				
Spring Thickness	Initial Set	Brace	Spring to Release.	Pull and Threads to Hold		
				1" Wide	1½" Wide	1¾" Wide
1/8"	About 2¼"	3½"	11½"	42 lbs. / 12	52 lbs. / 12	63 lbs. / 12
9/64"	About 2¼"	3½"	11½"	60 lbs. / 12	75 lbs. / 16	90 lbs. / 18
5/32"	About 2¼"	3½"	11½"	83 lbs. / 16	104 lbs. / 20	126 lbs. / 24
3/16"	About 2¼"	3½"	11½"	142 lbs. / 28	179 lbs. / 36	216 lbs. / 42
7/32"	About 2"	3"	10½"	188 lbs. / 38	236 lbs. / 48	285 lbs. / 56
1/4"	About 2"	3"	10½"	289 lbs. / 56	363 lbs. / 70	438 lbs. / 82

tical, however, to make two or three bows of different weights, all interchangeable on the same stock.

Bow strings: Bow strings for wood bows can be purchased or made from 6-cord flax thread. This kind of thread is used in stitching machines by shoemakers. Twelve threads will hold wood bows to 80 lbs., the loop at the end being made by turning the whole string back on itself. The string for a 23-in. steel bow is made on a simple wooden form, as shown in Figs. 17 and 18. In this case, the string is divided into equal parts to make the loops. Both loops and a distance of 4 in. at center are wrapped, and the completed string is waxed with beeswax. The string can be shortened by giving it several twists before fitting to the bow. The triangular-boxed figures in table



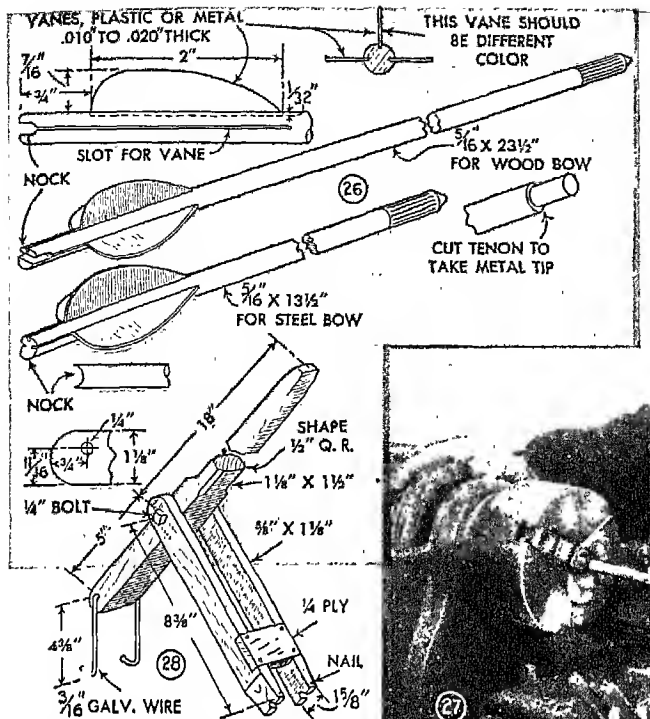
Stock for steel bow should be made from walnut or other hardwood. The bow is housed in a notch cut in forward end. All parts of the action must be metal and carefully made and fitted so they will withstand the strong pressure of the steel bow

Fig. 20 are the number of threads of 6-cord flax required to hold a bow of the drawing weight indicated. Stepping on the center of the bow while the ends are supported on wood blocks will bend the bow enough to permit slipping the string in place.

Stock for steel bow: Because of the heavier drawing weight, the stock for a steel bow must be made from walnut or other hard, strong wood. The stock should be laid out full-size, Figs. 21 and 24, then transferred to wood, cut out, and then machined in much the same manner as the wood-bow stock already described. An addition is the metal track on each side of forearm, Fig. 22. This originally was to protect the wood from the rubbing action of a metal bow string. The metal string (6-strand, 19-wire flexible cable 5/32-in. dia.) did not stand up under actual shooting and was discarded for the flax thread. The track, however, is worthwhile protec-

tion even with the flax string, although not essential. All parts of the action are metal, steel for the release, Fig. 23, and trigger, and aluminum or brass for release plates and string track. The bow is housed in a notch cut in the end of the stock, and is held by means of three locating pins and a bolt, as shown in Fig. 25. The carriage bolt is ground round under the head, which is sawed to form a screwdriver slot. The release pin is 1/4-in. diameter, slotted on one end for a screwdriver and threaded on other end to fit a tapped hole in the release plate. All metal parts are of ample strength for bows up to 400 lbs. drawing weight. Follow the release and trigger design closely; these parts are nicely balanced to provide positive holding while retaining a light trigger pull.

Arrows: Arrows for both bows are 5/16-in. birch dowel. Vanes are plastic, celluloid or metal, glued in grooves cut in the shaft.



Arrows are made from 5/16-inch birch dowel. The vanes are cut from celluloid and are fitted in the grooves cut in the shaft

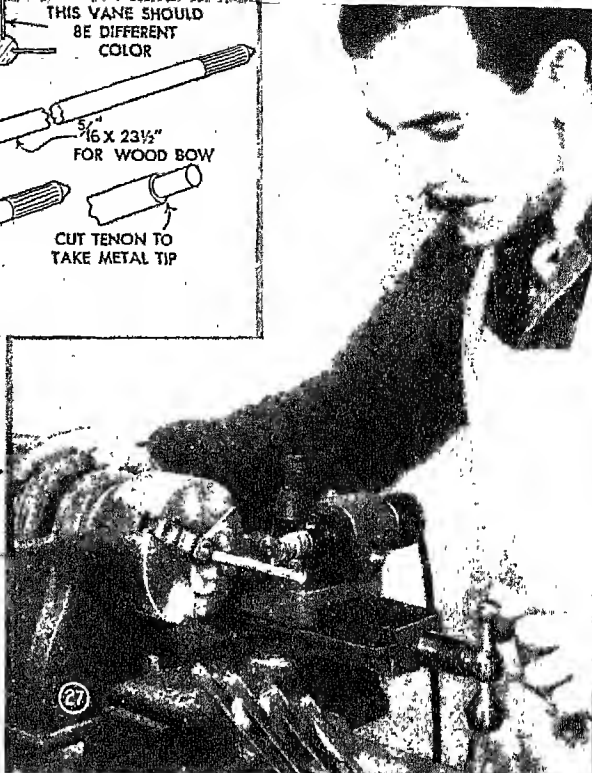


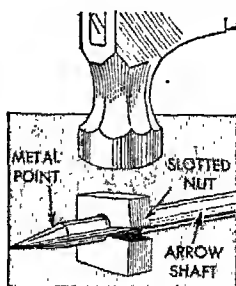
Fig. 27 shows one way of cutting the grooves, the shaft being held in the lathe, positioned by the indexing head, while a rotary hand tool mounted in a slide rest does the cutting. Vanes are mounted at right angles, Fig. 26, instead of the usual triangular pattern used for long bow arrows. This method of mounting provides perfect ruddering for smooth, straight flight and, at the same time, fits the mechanical construction of the crossbow.

Cocking lever: Bows up to about 100 lbs. drawing weight can be set by hand; over this weight it is necessary to use a cocking lever. Fig. 28 shows the construction and dimensions of a cocking lever for 11 1/2-in. draw. The galvanized-wire hook which slips under the bow will automatically assume a bent position the first time it is used. Photo Fig. 7 shows the manner of using the lever. If the release is set slightly forward, the trigger will cock automatically when the string engages the rear prong of the release.

Shooting: After cocking the bow, the crossbow is shot very much like a shotgun, sighting down the arrow to the target. A little practice will enable you to judge the range and drop of an arrow very nicely. When hunting, the bow can be carried

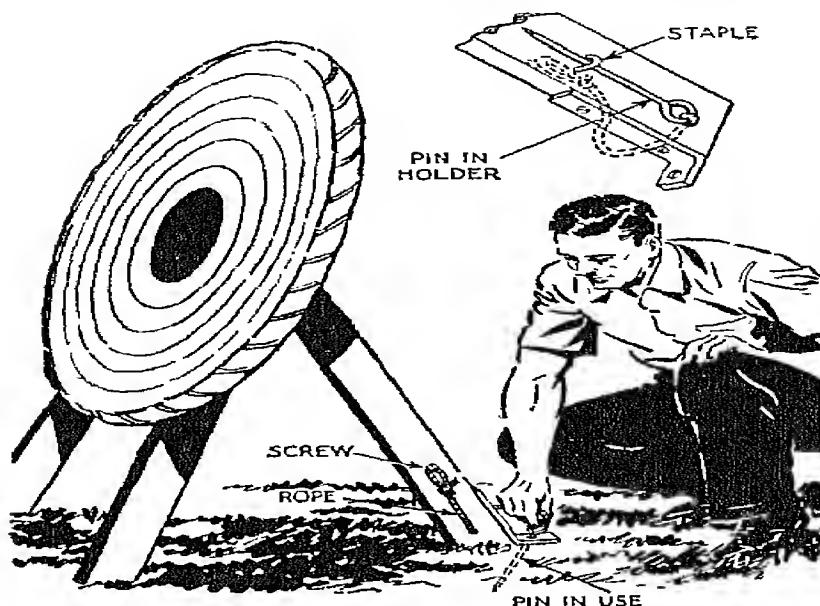
cocked but without arrow. When not in use, the steel bow is left braced, but the wood bow is unstrung. Needless to say, any bow over 100 lbs. packs a terrific drive, and the utmost caution should be exercised in its use. Never fit an arrow in place until you are ready to shoot, and don't point the gun in any other direction than toward the target when the arrow is in place.

Slotted Nut Crimps Metal Point On Wooden Arrow Shaft



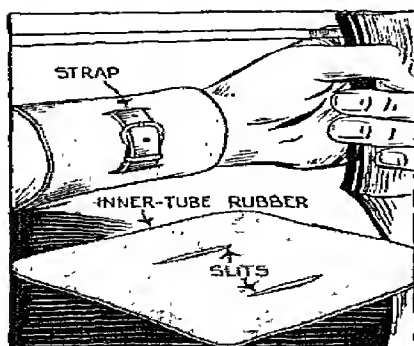
To crimp metal points on wooden arrow shafts, select a steel nut that will fit snugly over the shaft, slot it on one side with a hacksaw and then spread the nut so that it will slip over the metal point. By inserting the arrow shaft as shown and placing the nut on an anvil or other solid surface, the point can be crimped securely onto the shaft by striking the nut a couple of blows with a hammer.

Pin to Anchor Archery Target Fastened to Leg of Support



Here is a good method of anchoring an archery target so that the wind will not blow it over. One leg of the target support is fitted with a piece of flat iron, which is drilled at the lower end to take a long steel pin. In use, the pin is pushed through the hole into the ground. When not in use, it is removed and slipped under a staple in the leg. In this way, the pin is always at hand, and there is no possibility of it being misplaced.

Inner-Tube Shield Protects Wrist In Archery Practice

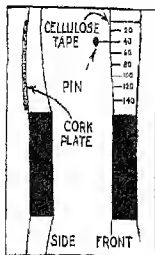


To protect your wrist from the whip of a bow string in archery practice, cut a piece of rubber from an old inner tube and slit it in two places near the center. It can be held in place securely by slipping both sides of your watch strap

through the slits before fastening the watch around your wrist. A flannel lining will help prevent irritating your wrist.

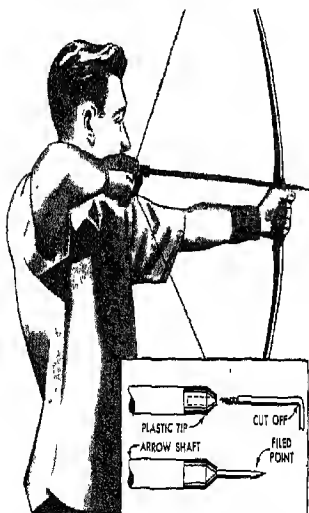
A Versatile Homemade Bow Sight

This simple, lightweight device has all the adjustable variations of an expensive bow sight, and with an average weight bow is fairly accurate for distances well over 100 yards. Cut from a strip of cork gasket material 1 in. wide by 6 in. long, the sight is fastened with adhesive tape to the back of the bow just above the leather grip. After gluing the cork in place, put a strip of cellulose tape on the belly of the bow opposite the cork. Stick a 2-in. round-head hat pin into the cork so that the head projects $\frac{1}{2}$ in. beyond the left edge of the bow. Then, by the trial-and-error method at various distances, determine the proper position of the pin for each distance and mark these positions in ink on the tape, numbering them accordingly. A coat of clear shellac will protect both the cork and the scale.



Arrow Penetration Increased

If you have plastic-tipped arrows in your archery kit, deep-penetration points can be made for them with screw hooks similar



to the one illustrated. The end of the plastic tip is ground flat, center-punched and drilled to receive the screw. After the screw is fastened in the tip, the hook is cut off and a sharp point is filed on the shank.

PART VI



for the
BOATMAN



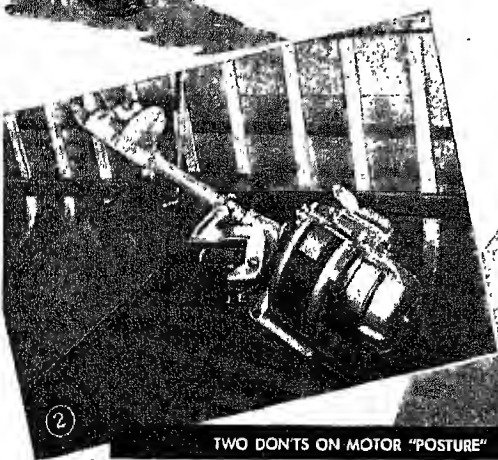
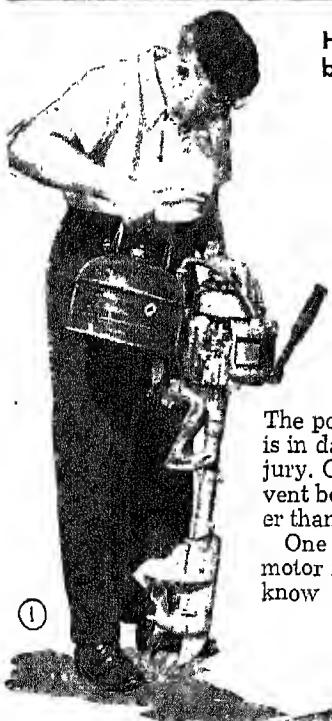
How to use and care for an outboard motor to give it long life

By C. E. Packer

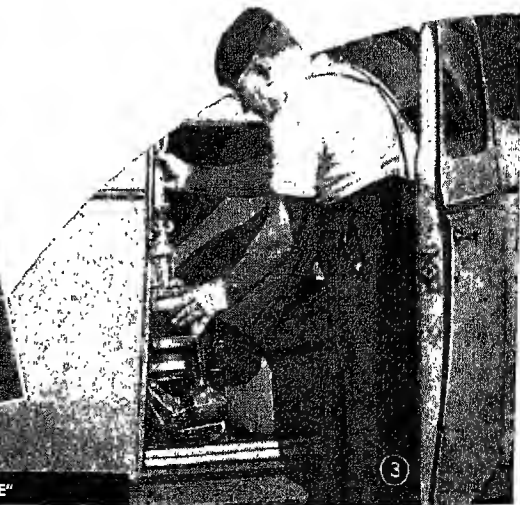
WHEN stuck in the middle of a lake with a dead outboard it is too late for remorse of unnecessary wear or damage to these little power plants. But many of the actions most harmful seem innocent enough. For example, a person who is most careful with his motor when carrying it in a car, may stand it on the tank and flywheel to be sure that it is held firmly as in Fig. 3. In this position, any water in the lower housing is likely to drain into the cylinder where it may cause serious damage. Sometimes you see a motor stored in a boat as in Fig. 2.

The power unit being lower than the propeller in this position, is in danger of cylinder rust, piston corrosion, and wrist-pin injury. Of course, padding the engine or tying it securely to prevent bouncing around is essential, but keep the power unit higher than the propeller end.

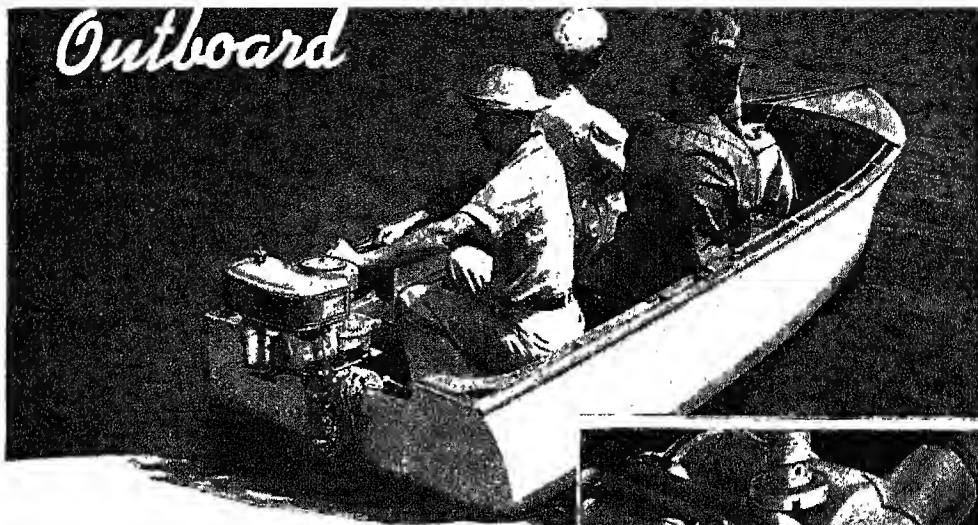
One of the greatest single causes of trouble with an outboard motor is carelessness in mixing the fuel and oil. Even those who know better frequently trust to luck that vibration will



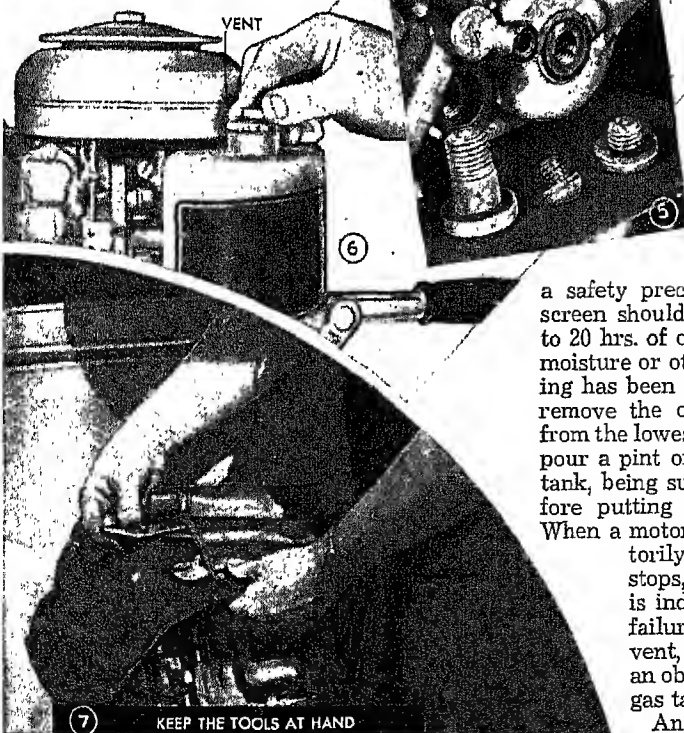
TWO DONTs ON MOTOR "POSTURE"



Outboard



blend the oil and the gasoline. If the gasoline and oil are not mixed thoroughly, gasoline alone may enter the motor and cause extremely rapid wear. Oil alone will make starting impossible. Therefore, it is best to mix the fuel in a clean container, such as the special outboard fuel can seen in Fig. 1. The small passages through which the fuel must travel are seen in Fig. 4. As the tiny strainer



screen shown on the pencil in this photograph handles the fuel and oil for a 5-hp. motor, it is apparent that a few tablespoonfuls of either oil or gasoline entering through the gas lines or carburetor bowl without being properly mixed may cause serious results. As

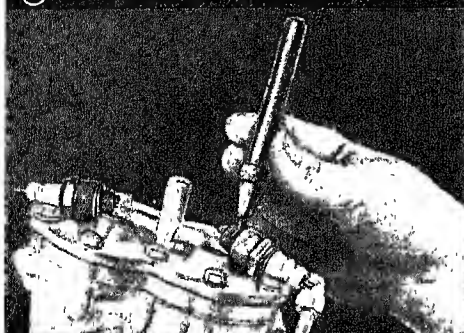
a safety precaution, the drain plug and screen should be removed after every 10 to 20 hrs. of operation and cleaned of any moisture or other foreign matter. If starting has been difficult, it is a good idea to remove the other screws seen in Fig. 5 from the lowest parts of the carburetor and pour a pint of clean gasoline through the tank, being sure to shake all of it out before putting the screws back in place. When a motor starts easily, runs satisfactorily for a few moments, and then stops, faulty gasoline flow usually is indicated. This may be due to failure to open the gas tank air vent, Fig. 6, or it may be due to an obstruction in the bottom of the gas tank, or in the gas line.

Another thing to remember is

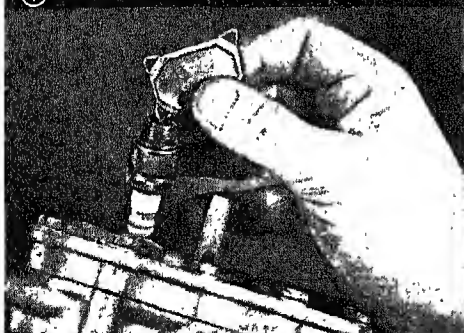
Hints on how to use outboard motors



⑧ FORCING PLUGS STRIPS THREADS



⑨ GRAPHITE ON PLUG THREADS

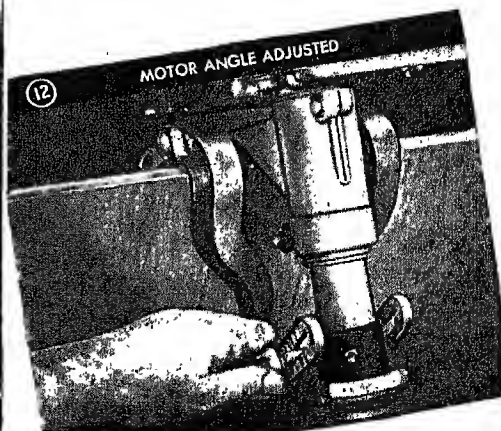


⑩ CORRECT POINT SPACING



⑪ CHECKING COMPRESSION

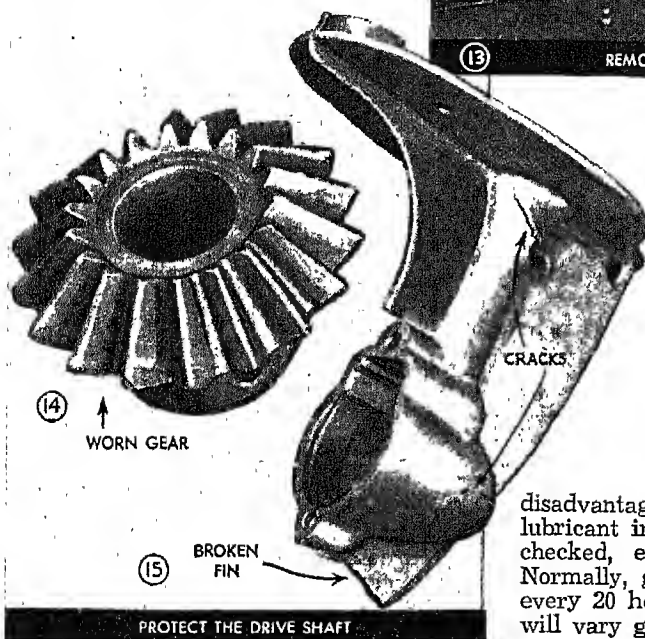
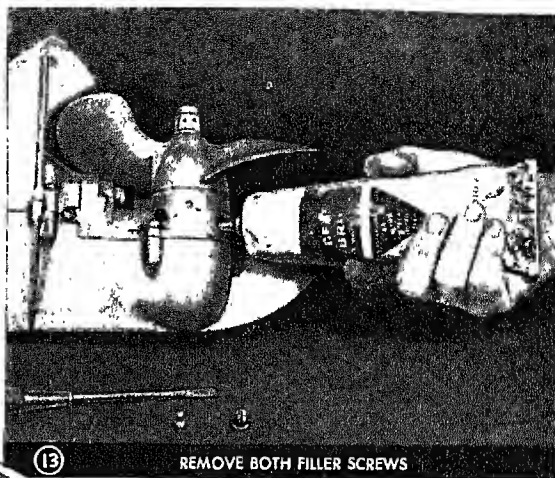
always to have the outboard tool kit aboard when under way, Fig. 7. Extensive damage to the motor often results when odds and ends of tools are resorted to in making repairs. Using pliers on the soft aluminum fittings of the motor may damage these parts so that they are useless. And, resorting to too large a wrench, Fig. 8, when installing spark plugs may strip the threads in the cylinder head. Perhaps the best protection against injury to the threads is to apply powdered graphite to the plugs before putting them in place, Fig. 9. This keeps the threads from seizing and makes the plugs screw in easily. Whenever replacing plugs, new gaskets should be used if available, and the plugs should be pulled down just tight enough so that the gaskets are noticeably compressed though not crushed. Failure to pull the plugs tight may cause them to burn. This results from gas escaping around them and raising the temperature above that for which the plugs were originally designed. In addition to this, there is a reduced transfer of heat from the plugs to the water jacket of the cylinder head. This combination teamed up in a high-speed motor can cause total plug failure in a short time. Of course, many motors are used at a lower rate of speed than formerly, trolling by the hour where permitted. Consequently, the selection of proper plugs introduces a new problem. One motor manufacturer advocates reducing the amount of oil in the fuel when the motor is used for trolling, which brings up the problem that one may troll for a period and then, finding results unsatisfactory, "give 'er the gun" and run over to another portion of the lake. Naturally if the fuel is low in oil content, heating and wear may result. For this reason, operators



⑫ MOTOR ANGLE ADJUSTED

and the things that you should avoid

who know exactly how and where they intend to fish invariably reduce the oil content for long periods of trolling and keep their high-speed fuel and their trolling fuel in separate well-labeled cans. Then, on a run of 15 to 20 min. out to the fishing grounds, they will dump in just enough gasoline of high oil content to make the fast run, after which the tank is filled with gas of low oil content for trolling. However, it is a good idea to carry a few extra plugs. If a plug has an insulator that is



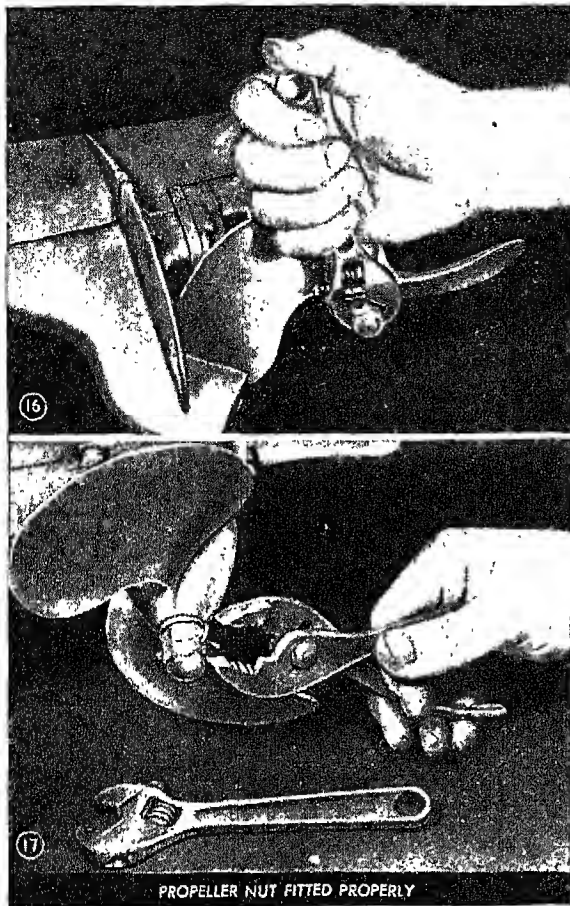
burned pure white, the plug is too "hot" for that particular motor or condition of operation.

Motors that operate satisfactorily at high speed may not run continuously and smoothly at low speed, due to slightly uneven compression. But for best results in any motor, absolutely uniform plug gaps set with a wire-type feeler gauge as in Fig. 10 will help. While the experienced operator learns to "feel" the compression of his motor by grasping the flywheel and turning it, still some operators measure the resistance by using their fish-weighing scale as in Fig. 11. In order to make comparable tests the motor should be warm and the oil mixture in the fuel should be

the same at each test period. On an alternate firing motor it is not necessary to remove a spark plug when making this test, though on a simultaneous firing (opposed) motor plugs of cylinders not being tested should be removed.

When operating a motor on different boats be sure that the drive shaft is vertical, or stands at right angles to the water when the boat is loaded. Failure to adjust the brackets seen in Fig. 12 may place the motor at a decided disadvantage in performance. Also, the lubricant in the gear housing should be checked, especially in smaller motors. Normally, grease should be added about every 20 hours of operation, though this will vary greatly in different motors depending on the tightness of the housing. When checking the unit, both upper and lower filler screws in Fig. 13 should be removed so that the housing will not be airbound. If there is any sign of water it should be removed and replaced by clean grease.

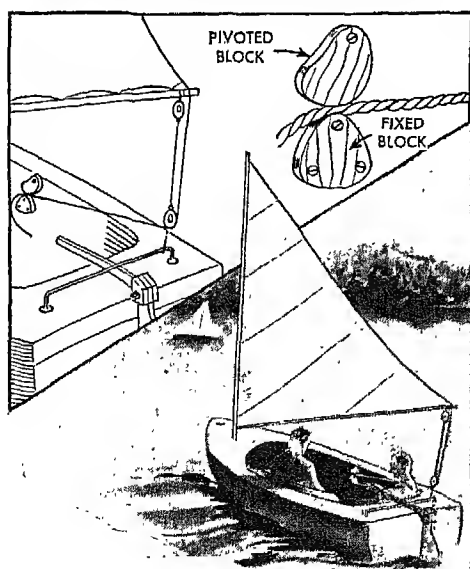
Perhaps the most common form of serious mechanical damage is caused by boulders or logs striking the underwater parts of the motor. Fig. 15 shows a gear housing from which the fin has been broken and in which two serious cracks have been caused by striking a submerged object at high speed. Even though the housing does not break as this one did, the drive shaft may be sprung enough to cause serious gear wear, as indicated by the gear in Fig.



14. If shear pins in the propeller persistently "let go" without the propeller apparently striking any object it is an indication that the flywheel is loose on the crankshaft and is imparting a violent rapping action to the propeller. When replacing shear pins it is important to pull the propeller nut up firmly, Fig. 16, yet not tight enough to strip the threads. The cotter pin used to lock the nut should be clipped off short and bent down as in Fig. 17. Any accumulation of seaweed on the lower housing or other obstruction to the flow of cooling water may burn up the motor. Due to failure of the water pump and lack of observation by the user, the motor may become overheated to the point where it loses power and stops. If this happens never turn the motor on end and let water run into the cylinders while they are extremely hot, and don't start the motor so that it will pump cold water into the hot cylinders. Instead let the engine cool off for about 30 min.

Engines operated in salt water should always be rinsed by running them in a barrel of fresh water before putting them away. Failure to do this may result in the complete eating out of all aluminum parts making expensive repairs necessary.

Instantaneous Sheet-Rope Release for Small Sailboats



Being able to release the main sheet instantly, when handling a small sailboat in a stiff breeze, may mean the difference between a capsized and a safe maneuver. This simple holder will grip the sheet rope tightly under strain, but will let go immediately when the strain is removed. The holder consists of two hardwood blocks shaped as shown and fastened in a convenient place inside the gunwale. As indicated, one block is screwed in a fixed position and the other is pivoted directly above it in such a position that when the sheet rope is placed between the blocks and pulled sternward the top block will be pulled in toward the bow and pinch the rope. Instant release is obtained by jerking the slack sheet forward so that pinch is broken. Then the rope will be shaken out from between the blocks and run free.

Keep extra shear pins in the handle of an outboard motor and they will always be at hand if one is sheared in the propeller.

Servicing Your OUTBOARD

HAVE you ever noticed some fisherman fruitlessly cranking his outboard motor with an occasional "spit and sputter" the only reward for his labor? Such hard starting generally can be avoided if you use the recommended gas-and-oil mixture and if the motor is properly serviced from time to time to keep it in tip-top condition.

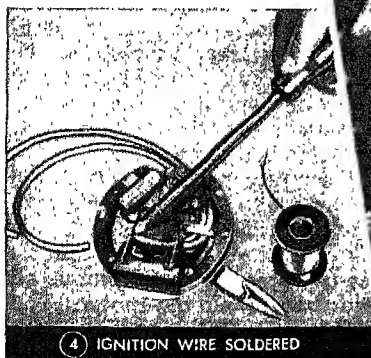
Ignition: Housed under the flywheel, Fig. 13, the ignition system of a modern outboard motor is surprisingly dependable, but it does require attention. At least once each season the flywheel should be removed and the entire magneto cleaned and adjusted. On many motors the nut that tightens the flywheel also serves as a flywheel puller, Fig. 1. A shoulder on the nut contacts the starting-rope plate, and after the nut is loosened, a turn or two forces the flywheel from the tapered end of the crankshaft. All electrical connections should be checked for tightness. A loose condenser should be tightened, Fig. 2, as this may cause hard starting. Ignition points should be faced true on an oilstone and set to factory specifications. In the absence of such information, adjust the points to open .018 to .020 in., Fig. 3. Lubrication consists of a tiny bit of light oil applied with a toothpick to the pin that supports the movable contact point, and just a touch



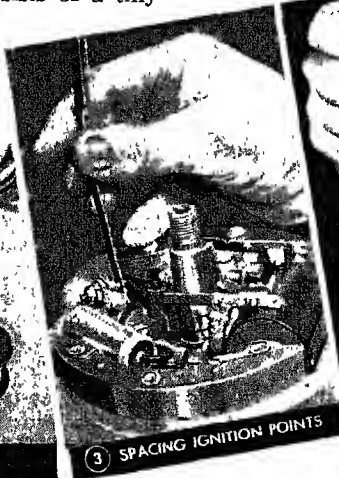
① REMOVING NUT THAT TIGHTENS FLYWHEEL



② TIGHTENING THE CONDENSER



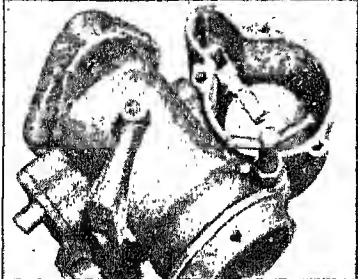
④ IGNITION WIRE SOLDERED



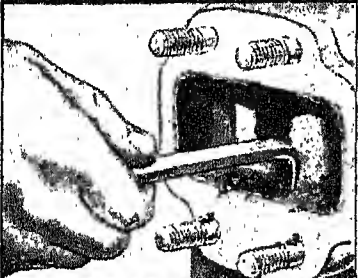
③ SPACING IGNITION POINTS



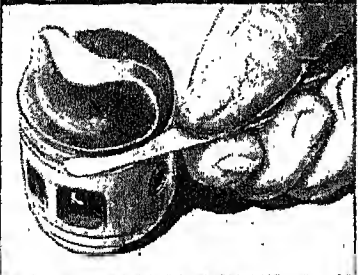
⑥ CORK FLOAT TO BE RECOATED



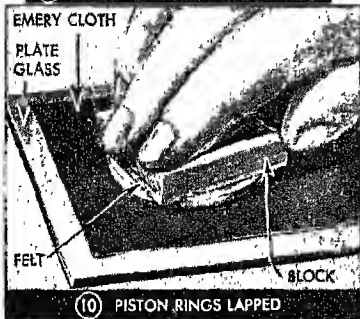
⑦ RESOLDER LOOSE METAL FLOAT



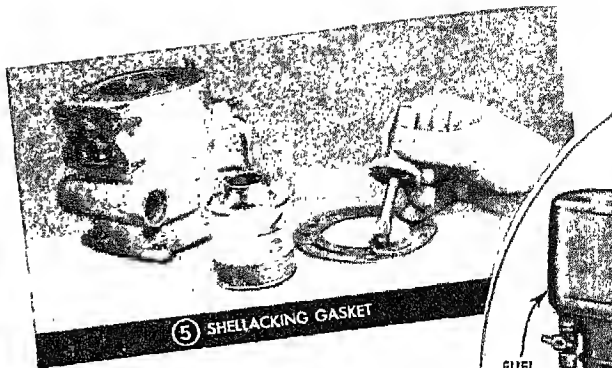
⑧ SCRAPING EXHAUST PORT CLEAN



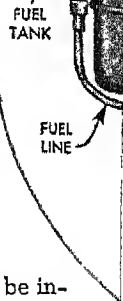
⑨ CHECK RING-GROOVE CLEARANCE



⑩ PISTON RINGS LAPPED



⑤ SHELLACKING GASKET



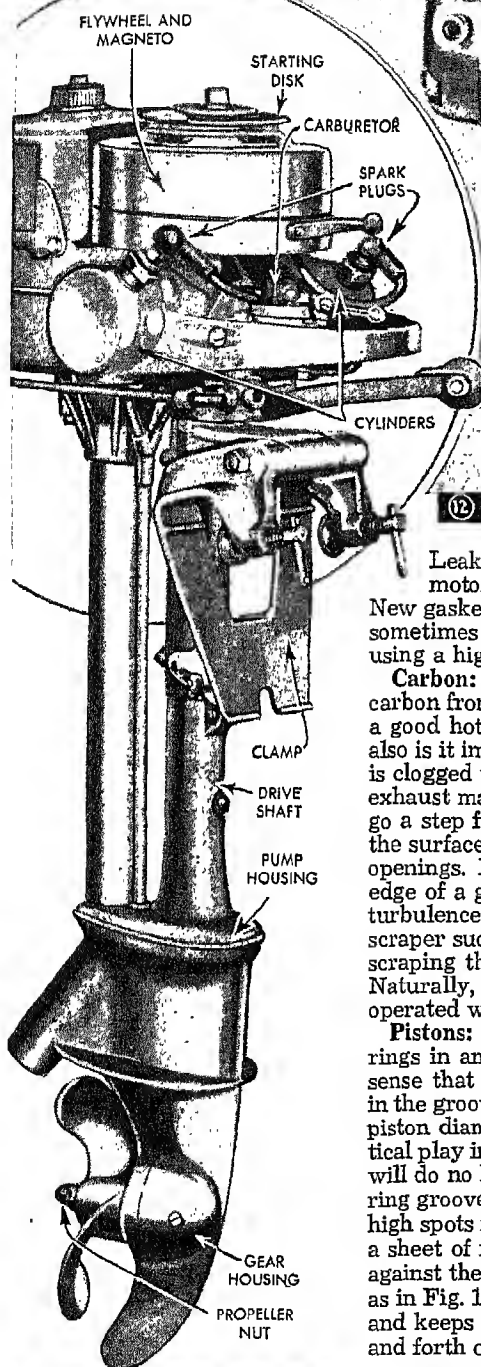
of hard grease applied to the cam which is an integral part of the crankshaft. If starting has been difficult, it is a good idea to take the flywheel to an authorized outboard-motor service shop and have the magnet recharged.

After several seasons of use, constant flexing of the high-tension wires, as a result of advancing and retarding the spark, may cause insulation cracks which lead to loss of spark. If available, new wires should be installed as in Fig. 4. In soldering electrical connections always use non-corrosive flux—never acid flux! When testing the spark of an outboard magneto it is important that the ignition wires be held not more than $\frac{3}{8}$ in. from some metal part of the motor to which the spark may jump. Cranking the magneto with the wires hanging in space invites a breakdown in the insulation of the coil.

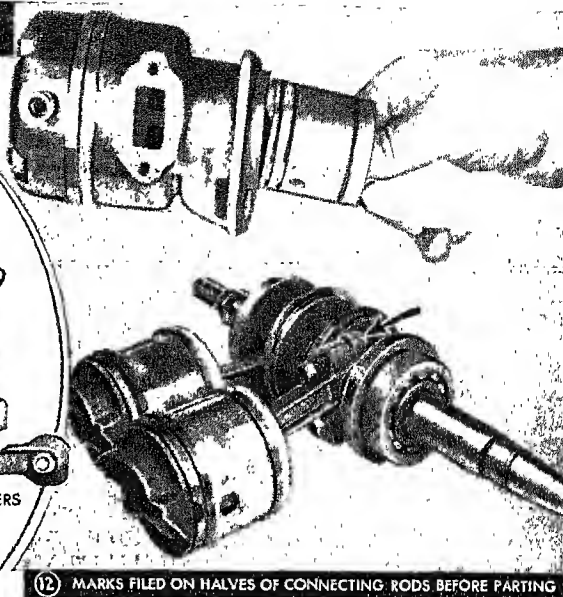
Carburetors: Sometimes the shellac coating on cork floats gradually deteriorates, allowing fine particles to loosen and clog the carburetor. Then the float also loses its proper buoyancy and cannot control the gas flow. The permanent cure for this condition is to remove the float and allow it to dry thoroughly. After this, any loose particles should be sanded off and the entire float given two thin coats of shellac, Fig. 6. Also, it is not unusual to find floats disconnected from the arm, with the result that the carburetor shuts off all fuel, and operation becomes impossible. As this type of carburetor has a metal float, the cure is to solder the float back onto the arm, Fig. 7. Any metal float that has a leak should be pierced with a needle opposite the leak, so that all the liquid and fumes can be blown out. Then the hole and original leak should be soldered, using as little solder as possible to avoid reducing the buoyancy of the unit.

Compression: Although everyone realizes the importance of compression in the combustion chambers, the necessity of compression in the crankcase of a two-cycle outboard motor often is overlooked. Without this compression, the fuel charge is not delivered effectively to the cylinders. A simple check for crankcase compression is to remove all the spark plugs and then crank the motor. You should be able to feel very slight compression in the crankcase and to hear a definite "popping" sound.

11 NEW PISTONS SHOULD BE CHECKED CAREFULLY FOR FIT



13 ARRANGEMENT OF PARTS ON TYPICAL OUTBOARD MOTOR



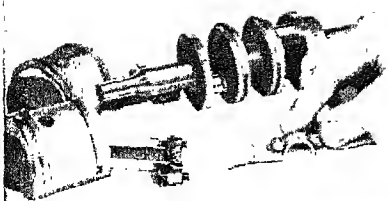
12 MARKS FILED ON HALVES OF CONNECTING RODS BEFORE PARTING

Leaky gaskets, loose bearings or shaft glands in some motors can totally destroy crankcase compression. New gaskets should be installed, or if these are unavailable, sometimes the old ones can be made compression tight by using a high grade gasket cement as in Fig. 5.

Carbon: One of the most essential services is removing carbon from the exhaust system, Fig. 8. As one cannot build a good hot fire in a furnace that is clogged with ashes, so also is it impossible to get good operation from a motor that is clogged up with carbon. It is not difficult to remove the exhaust manifold and scrape the exhaust ports. Some even go a step further and streamline the passages by polishing the surfaces in the exhaust opening as well as in the intake openings. In streamlining the gas passages be sure that the edge of a gasket does not project into a passage and cause turbulence, thereby restricting the flow. Frequently a hand scraper such as is used for fitting bearings proves useful in scraping the edge of port or piston for perfect alignment. Naturally, care must be taken to see that the motor is not operated with any metal particles left in the cylinder.

Pistons: Contrary to popular opinion, the pistons and rings in an outboard motor do not need to be tight in the sense that they butt closely at the ends or fit very snugly in the grooves. An end gap of .004 to .005 in. for each inch of piston diameter generally will prove satisfactory, and vertical play in the grooves of as much as .004 or .006 in., Fig. 9, will do no harm provided the rings are not warped and the ring grooves are not rough. Lapping piston rings to remove high spots is done on a piece of plate glass on which is held a sheet of fine emery cloth. The ring is pressed uniformly against the cloth by a small block of wood padded with felt as in Fig. 10. The felt assures uniform pressure on the ring and keeps the block from slipping. Working the ring back and forth over the fine emery in a figure-eight pattern will remove any high spots. Obviously this operation should be done only to the amount required to get a true surface.

Prior to removing any part from a motor, it is well to mark the part on an unfinished surface so that there will



(14) DRESSING CAP ON CONNECTING ROD

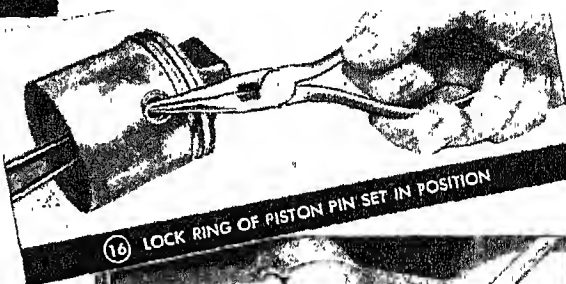


(15) CONNECTING ROD FALLS FREELY

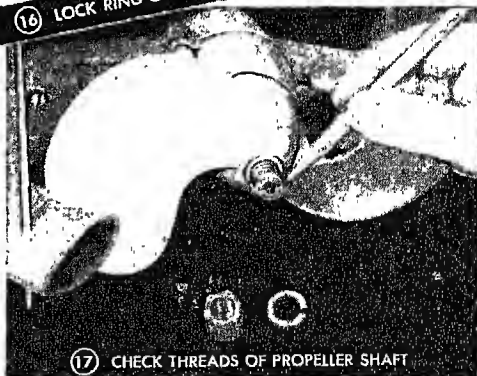
be no question about returning it to its original location. As indicated in Fig. 12, this is especially true when removing connecting-rod bearings which should be marked lightly with a file or sharp center-punch before being taken from the shaft.

Should it be necessary to install new pistons, be sure they have proper clearance, Fig. 11. Since fitting a piston too tight can cause serious trouble, installation of new pistons should be left to outboard mechanics. While in automotive service a "rule-of-thumb" way of checking pistons is to figure on .001 in. of clearance for each inch of piston diameter, the average clearance for outboard work will be more nearly .0015 in. for each inch of piston diameter. Finally, after the rings and pistons have been fitted, the owner who wants peak performance follows the example of outboard racing drivers and laps in the pistons and rings with a creamy paste consisting of a soft abrasive window-cleaning powder and light engine oil. This paste is dripped in through the port while the motor is being cranked with power applied generally by a heavy-duty electric drill or a lathe, continuing to run the motor in this way until all surfaces have a fine finish and there is no drag anywhere. Then, the entire motor is dismantled, after which all traces of the abrasive are washed out thoroughly with gasoline.

Connecting rods: Fitting connecting rods is something that the mechanically inclined owner can do himself, and when there is unusual clatter in a motor it may suggest that the bearings should be tightened. Rod adjustment can be done by facing the bearing halves as seen in Fig. 14. Too tight a fit must be avoided. While no noticeable play should be present in the rod when properly fitted, still there must be absolutely no drag, and the rod must fall freely of its own weight when checked on the tip of the finger as in Fig. 15. One thing that certainly will damage a motor results when the lock ring at the end of the wrist pin works loose. Continued operation after this has developed will be certain to ruin the piston and cylinder. Consequently, when working on any motor, it is most important to see that the ring, Fig. 16, is securely snapped into position. When operating a motor that has an unusual noise it should be checked immediately or it may be damaged beyond repair. If your outboard develops a sing-



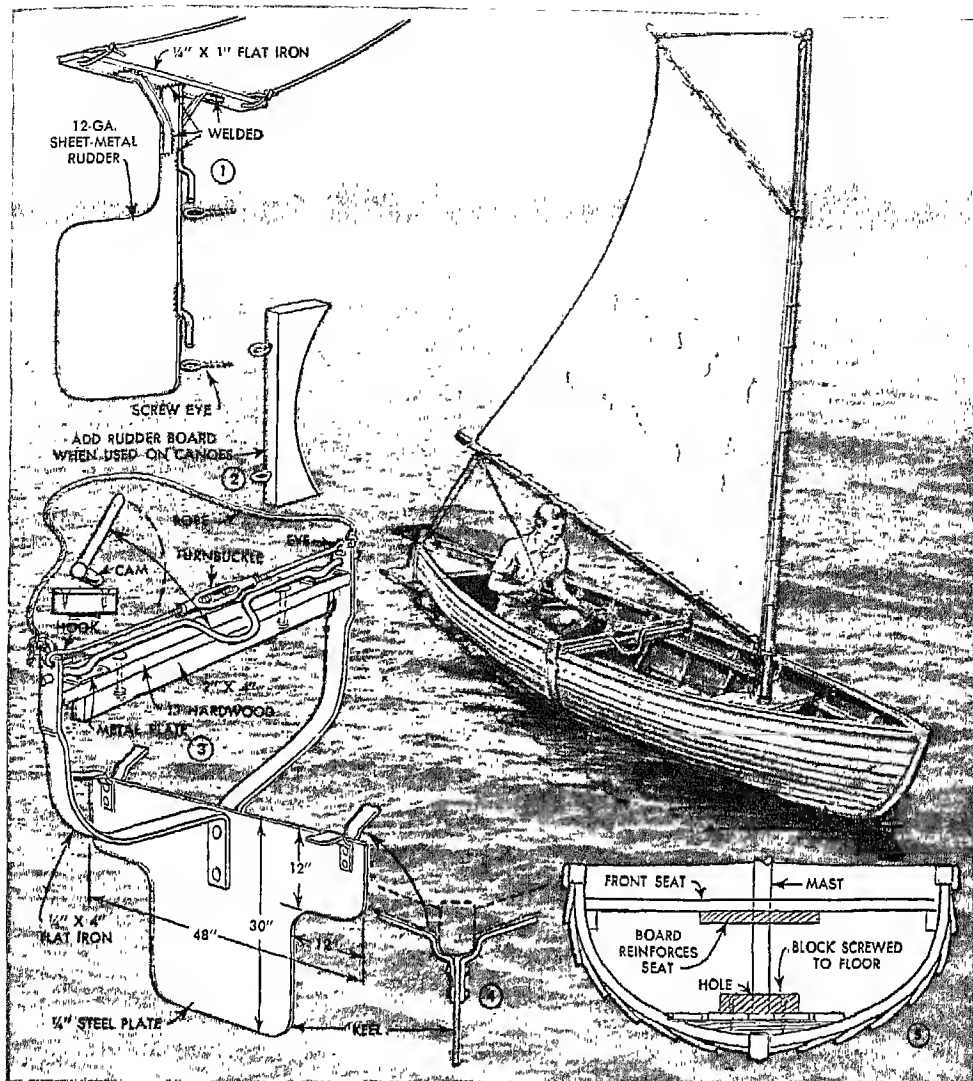
(16) LOCK RING OF PISTON PIN SET IN POSITION



(17) CHECK THREADS OF PROPELLER SHAFT

ing sound, by all means check the lubricant in the lower housing or you may soon have a set of junk gears.

Propeller: And while on the subject of servicing the lower end of the motor, it sometimes happens that forcing the propeller nut on too tightly injures the threads on the propeller shaft, Fig. 17. When this has happened, it may be possible to clean them up a bit by using a three-corner file.

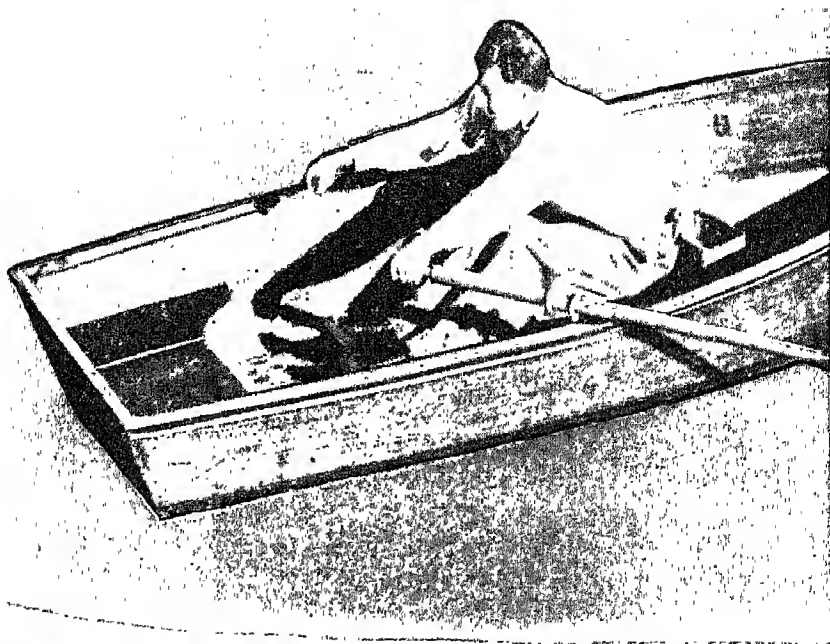


Let the Wind Give You a Thrill

Once this detachable keel is installed on your rowboat and locked in place with the camming arrangement shown you not only can run free before the wind with a suitable sail but you also can do systematic tacking in any safe sailing waters. For fishing or other uses where the rowboat's shallow draft is necessary or desirable, simply unclamp the keel assembly and slide it over the stern, then unstep the mast and there you are, ready for the oars again. Only general dimensions are given in the details, Figs. 1 to 5 inclusive, as the clamping yoke and saddle arrangement must be made to fit the boat at hand. The halves of the saddle are shaped to fit the

curves of the hull near the midship section and the top ends of the halves are offset slightly as shown to clear the gunwales. After bending to shape, the parts

are riveted to the keel as in Fig. 3. Projecting "ears" or pads also are riveted to the ends of the keel, Fig. 4, to give a more rigid bearing. Of course you must have a rudder, Fig. 1, and, if attaching the keel to a canoe, you will need the rudder board, Fig. 2. Usually the front seat can be utilized as a mast step where indicated in Fig. 5. Only one method of rigging the sail is shown. There are, naturally, other rigs which are equally simple and safe.



ROW GENTLY

YOU DON'T have to be a brawny weight lifter—or even half of one—to row a boat easily and well. The trick is in knowing how. Just watch an old-timer between the oars and you'll get a few pointers right away if you observe closely. There's no splattering of water, no rolls or gurgles—the stroke of the oars is slow, the rower's whole manner impresses one as plain lazy. But, unless you are a skilled boatman just jump in another rowboat and try to follow him singlehanded. He'll leave you behind as if you were painted on the landing.

Here are some of the reasons why: In the first place, for rowing on rough water the pretty technique of collegiate racing crews won't altogether do. The average rowboat is a tougher, more seaworthy craft than the average racing shell and it rides higher out of the water. It lacks such refinements as "roller-coaster" seats and sliding footrests. But there are some ideas in racing which can be applied to ordinary rowing and they'll give you more miles with less manpower.

While it is true that you'll learn a lot by watching good oarsmen, the only way really to learn correct rowing technique is to get the oars in your hands and begin rowing, just as you would with any other work or sport requiring the development of manual dexterity through continued practice. While you're learning, go out in the boat only on quiet days. It's not a good idea to attempt handling a rowboat in rough water, unless, of course, you take an experienced oarsman along to coach you. Always take it slowly during the practice periods. Speed and skill come later. At first concentrate on handling the oars—how to drop the blades into the water and get them out again without throwing or splashing water to no practical purpose. Getting down to first principles the theory says simply that the energy spent throwing water

into the air should have been expended pushing the boat forward.

The rower holding the straight course and getting away fast is the one to watch, for you can be sure he



Ordinarily it's common practice to use oars that are twice the beam width or roughly twice the width of the thwart. Chafing bands should center in the rowlocks when the oars are in position



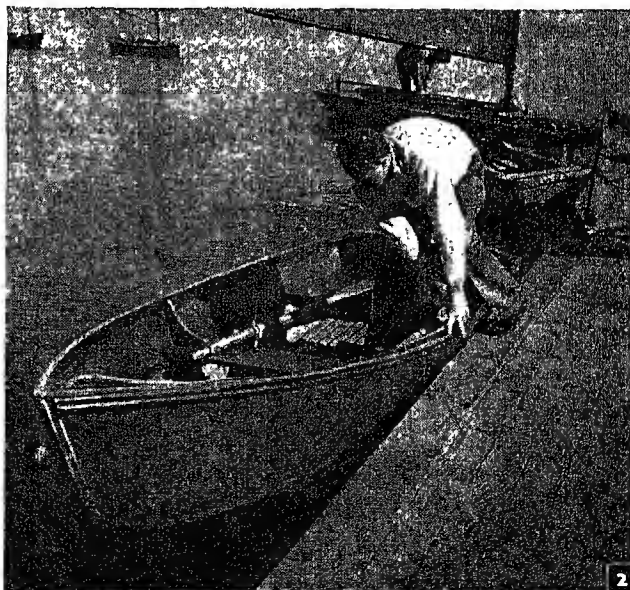
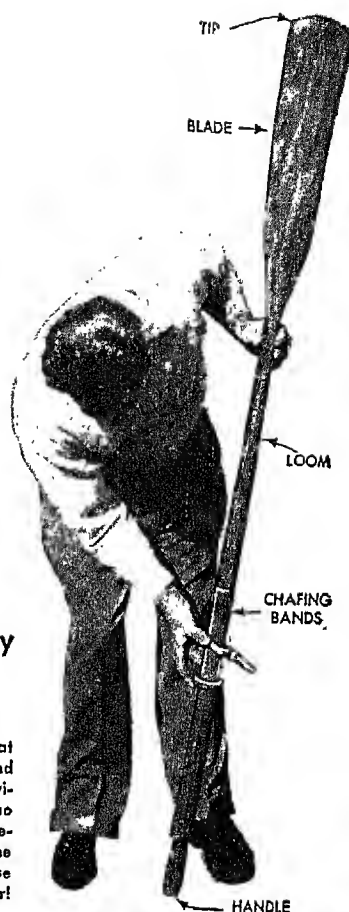
By Richard W. Emery

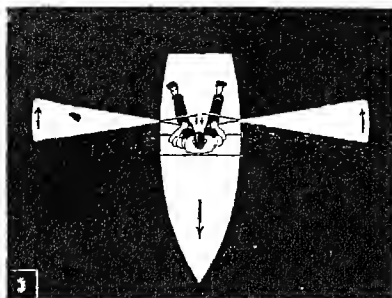
Photos by Ray Chapin

knows exactly what he's doing, where he's going and about how long it will take him to get there.

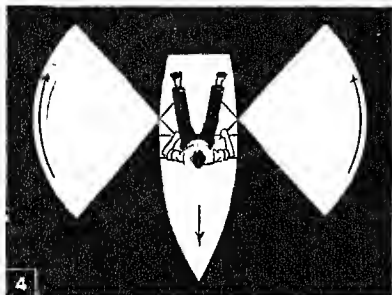
Don't take out a boat without first making reasonably sure it will bring you back. If it's your boat, look it over carefully before you launch it. Make this a habit and you won't miss. Do the same with any craft you rent. Look sharply to the rowlocks, the seats, or thwarts, if you want to be salty, and to the bottom boards—those you walk on. Do all this before you bother to examine the oars. If you're going out on fairly deep water where the wind may come up and make the water choppy, provide life preservers, a bailing bucket and an anchor with plenty of line. These are just ordinary common-sense precautions without much to do

Above, right, photo shows what a good oar should look like and also names its principal divisions. Oars should not be too springy in the loam section. Below, take that first step into the center of the boat, otherwise you may end up in the water!

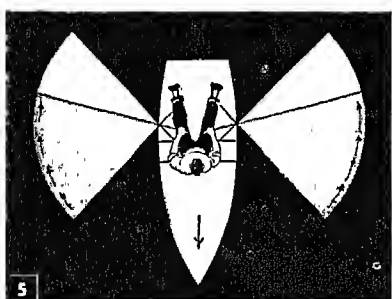




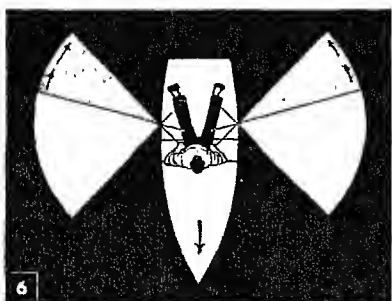
3 Short strokes get you away from the landing and well out into the open water. Long sweeping strokes will take you on from there



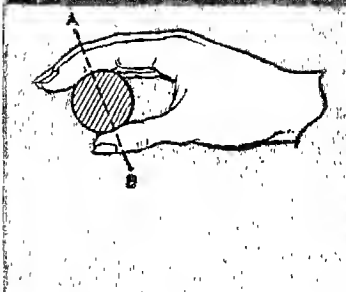
4 The arc described by the oars when making a full stroke is determined to some extent by reach of the rower. Above is average



5 About two thirds of the power stroke is made with the arms very nearly straight. Some good rowers keep arms straight out



6 The final one-third stroke is made with the arms bending at the elbows but with wrists still "locked" until they reach the chest



Position of the hand just as the oars dip at the beginning of the stroke. If you grip the oar handles too tightly both hand and arm will soon tire. Dotted line A-B represents approximate angle of the blade. See Fig. 16

with the actual rowing, but they may help to get you home again.

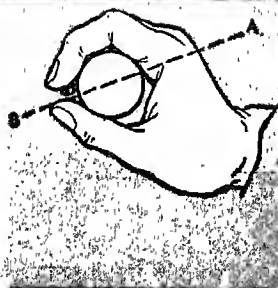
The oars should fit the boat. That's a first requirement. Fig. 1 gives the average proportions while the photo above Fig. 2 shows what a good, sound oar should look like and also tells what to call its principal divisions. Again the don'ts: Don't take out an oar that's warped or one that has a weather-roughened handle. It'll cut your hand to pieces on a hard row. A tear, break or bulge in the chafing band will bind in the rowlock and make the oar difficult to manipulate. Some oars, due to age or other causes, are too springy in the loom section for good rowing. An oar should be fairly stiff. Considerable pressure should be required to deflect a good one as much as 2 in. or so. When buying new oars or renting a boat for a long row on open water, check the oars for uniform weight and correct springiness. And note in Fig. 1, that the oar length is about twice the beam of the boat. That's an average requirement, not an absolute rule. But all things considered, oars of this length handle easier under average rowing conditions.

Another important feature is the position of the chafing bands. When you're in rowing position with the oars in place, ends of the handles should clear by at least 2 in. and the chafing bands should center in the rowlocks. Some good oarsmen like the ends of the handles farther apart, as much as 6 in. in some cases, but that of course is a matter of personal preference. In general the proportions of oar length to beam given in Fig. 1 give better purchase.

Stepping from the landing into a boat may be a trickier venture than it appears to be. If you step into the boat and push it away from the landing



Position of the hand as the oar nears the finish of the power stroke. Keep the elbows close to the body as you drop handles to lift blades clear. Line A-B is intended to show the approximate angle of the blade just before it leaves the water.



Keep arms close together, elbows down, as feathered oars move forward to start new stroke. When arms straighten the wrists rise

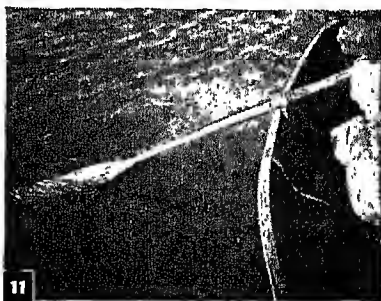


This is the angle the blade should make with the water as the stroke begins. Note lower edge of the blade is leading slightly

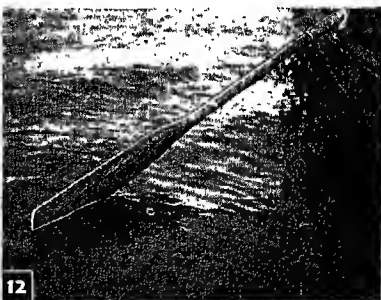
with one foot, while the other foot supports part of your weight on the landing, you may end up in the water. Hold the craft against the landing, place one foot well into the center of the boat and on the bottom boards. Keep your weight low, as in Fig. 2, then transfer quickly into the boat and sit down. Always "trim" a rowboat by sitting in the center of the thwart and instruct your passengers to position themselves so that the craft rides on an even keel. You can't row well if weight causes the boat to list to port or starboard. Also, if you have a load, the boat should be trimmed fore and aft as well. As a rule the bow should ride a little higher than the stern. You'll stay a lot drier if you never stand on a thwart, but always on the bottom boards. And if you are boating solo, stow everything for the trip within easy reach so that you won't have to leave the seat while offshore.

A gentle push will put the boat clear of the landing. Only then do you place the oars in the rowlocks. Once the craft is riding free, the beginner at rowing should resist the urge to dig the oars deep and give it the heave ho. From here on you take a tip from the racing crews and dip 'em gently. Drop the blades lightly into the water and take a series of short, light strokes, only about 18 in. or so until you get underway. Then lengthen the stroke to the full sweep, Figs. 3 to 7 inclusive, and settle down to that long, rhythmic swing that makes the workouts of collegiate rowing crews something to watch.

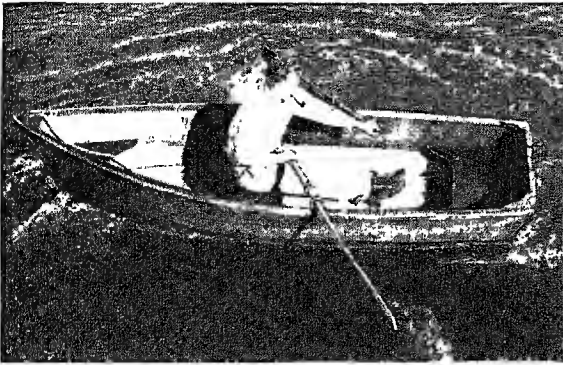
If the oar handles are gripped too tightly, arms and hands will tire quickly. You won't be able to feather the oars correctly and your back will do work that your fingers should do. At the start of each stroke, the pull of the handle should lie within



Three-quarters of the blade under is about right for average rowing. At this point oar will take pressure without throwing water



Chopping the blade into the water perpendicularly will likely cause it to bite too deep. Some boatmen call this "crabbing"



If you find you must turn around in a boat length, just back-stroke one oar and pull hard on the other. Around you go—fast!

the curve of your fingers and thumb, as in the detail below Fig. 7 where the dotted line A-B represents the angle of the blade. In this way, several inches are added to the length of the stroke. Through about two thirds of the power stroke, Fig. 5, your arms should be nearly straight. Your legs and back do most of the work. Then the arms take over, for the final third of the stroke, Fig. 6, bending at the elbows and bringing the oar handles close to your chest. As the stroke ends, the wrists drop, and the blades emerge at a 45-deg. angle, dotted line A-B, Fig. 8, complete their turn to a 90-deg. angle parallel with the surface, and are ready to return to the starting point of the next power stroke. Study Figs. 8 to 12 inclusive, and also Fig. 16.

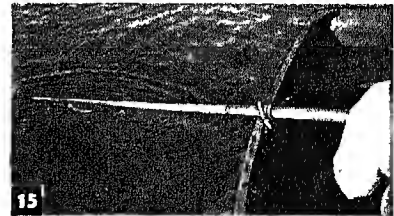
When you bend your elbows in that final one third of the power stroke, keep them close to your body, Fig. 14. Then they will be in position for easiest flexing of the wrists to make the special twist of the blades known as "feathering." This is necessary to prevent the wind from catching the flat blades and slowing forward speed. A little extra push or flip to the last part of the stroke gives speed to the boat just as a pitcher's fingers give speed to a ball. It also helps to bring the blades cleanly out



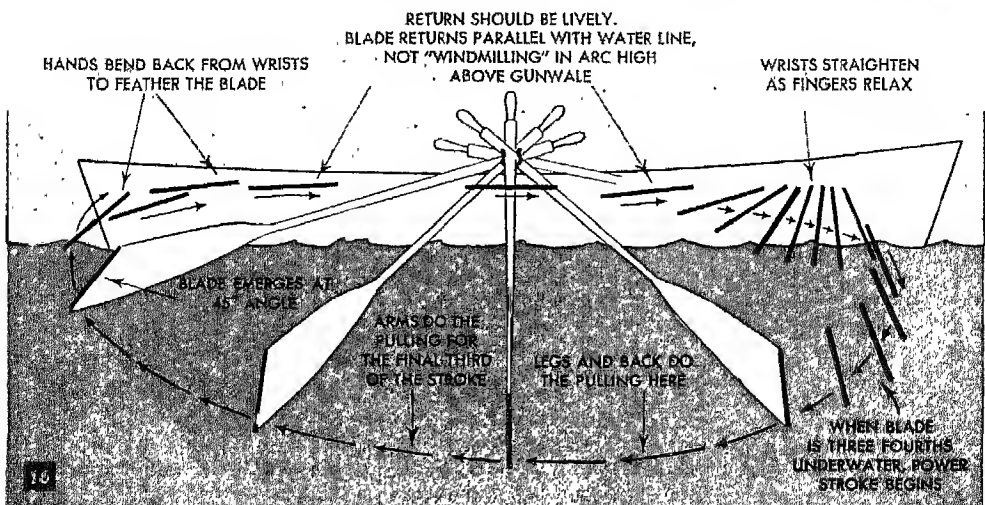
This happens when you pull hard on an oar which enters with the blade perpendicular to the water. It dips too deep. See Fig. 12



Power stroke nearly completed. Wrists do not bend until almost against the chest. Then the wrists snap down and hands rise



Blade at a 45-deg. angle at completion of stroke. Blade slips out without splashing water. Twist of wrist feathers the blade



of the water, Fig. 15. Catching the oars on the rebound from that final flip against the water, and returning them briskly in feathered position, conserves strength and provides a resting point just before the beginning of a new power stroke. The rest is only momentary, of course, but it relaxes your arm, legs and back. The blades turn from feathered position in order to dip again into the water. See Fig. 16. Blades should be slightly off vertical, with the lower edges leading. This whole maneuver is a neat trick and it's worth a lot of practice. Fig. 16 shows the cycle of one complete stroke in ordinary rowing—not the racing stroke where feathered oars are skipped along the surface of the water.

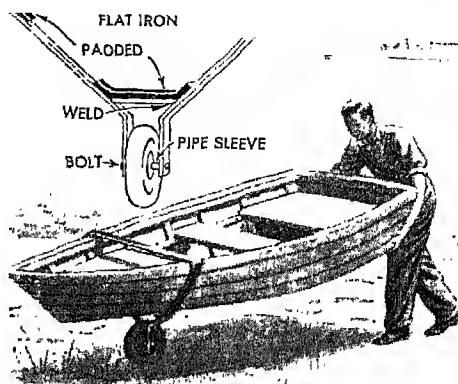
Starting the power stroke before the blades are three-quarters immersed, Figs. 10 and 12, wastes strength and upsets rhythm. A skilled oarsman knows by the feel of the blade when to start the power stroke. From long practice he learns just when the blade will "bite" with full effect.

With a light grip on the handles you can slip the blades into the water without splashing. A moderate chop won't bother, once you get the knack of feeling for the water before pulling on the oars. In rougher waters, one blade probably will take hold before the other. This may be troublesome at first, but the same gentle pressure on the oars, until they both get a grip on the water, will bring you home dry.

To hold a straight course is generally quite easy. Just use the boatman's trick of taking a sight on two distant objects astern which happen to line up conveniently and then vary the pressure on one oar or the other, without breaking the rhythm of your rowing. You'll find a good boat quite sensitive to variations in pressure on the oars which makes it easy to keep the objects in line. After a time this dodge will be unnecessary. You'll get eyes "in the back of your head" like all good rowboat men. For maneuvering in close quarters, you may find single-stroking very handy. To rowing, it's what dog-paddling is to swimming. Stroke alternately, port and starboard, making the oars "walk" through the water. This stroke is restful, too, after rowing a long distance. You can turn a boat almost in its own length by pulling on one oar and pushing on the other. See the photo at the left of Fig. 13. Pull on the right oar to turn left and vice versa. By making quick, short strokes with one oar without lifting the blade out of the water you can warp a boat sidewise up to a landing or alongside another craft anchored well offshore. Finally, when anchoring in open water ship the oars. Don't take any chances on losing an oar. It floats, of course, but might be hard to recover in rough water.

Wheeled Dolly for Small Boats Makes Moving Them Easy

One man can handle small boats easily with the help of this dolly. It is made of flat iron formed to slip over the bow of the boat. Two legs extend downward to act as



a fork for the wheel which is, preferably, one that has a large rubber tire. A bolt serves as an axle and spacing sleeves are used on both sides of the wheel to keep it centered. The corners of the dolly are padded to prevent scratching the finish on the sides of the boat.

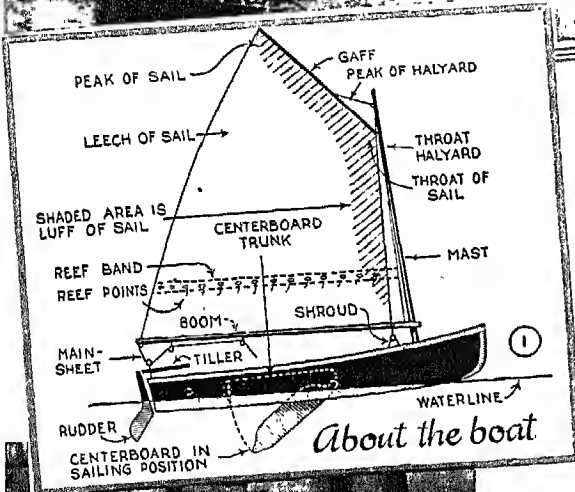
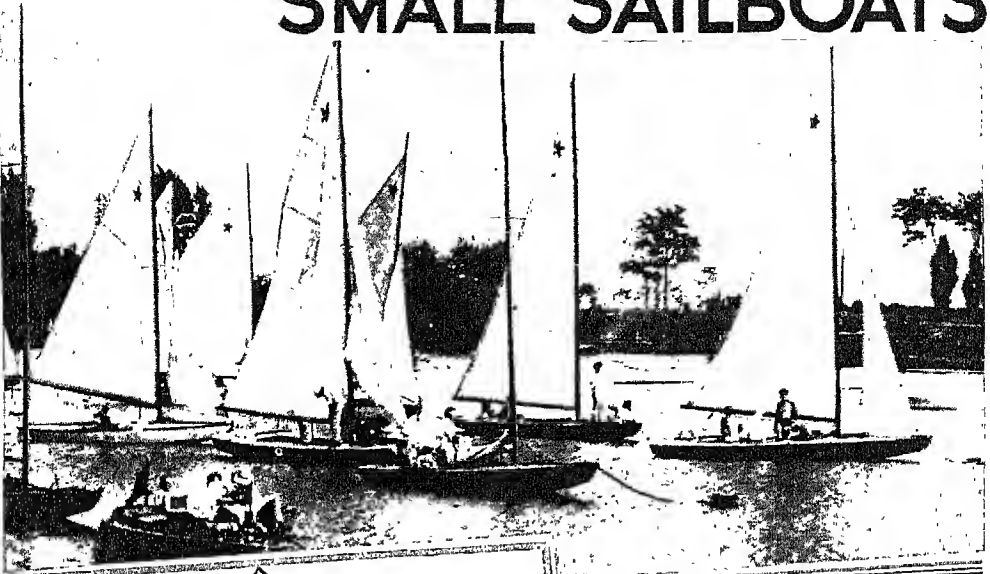
Coat Hooks Used as Oar Rests

Instead of allowing the ends of oars to float free in the water or putting them inside the boat when not rowing, screw wire coat hooks to the sides of the boat



to hold the oar blades out of the water. When the oars float free, the handles may be in the way of the people in the boat, and when the oars are inside the boat, water drips on the seats and bottom.

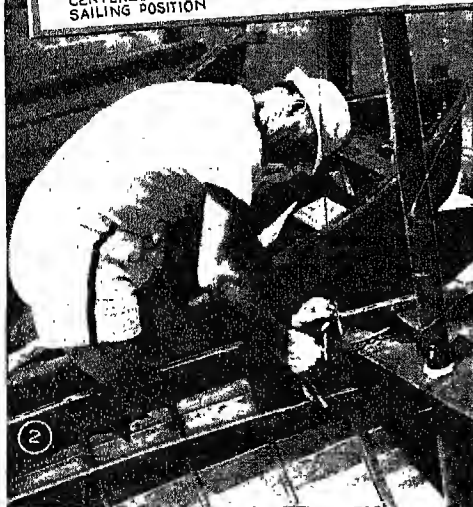
SMALL SAILBOATS



The three main points of sailing a small boat explained, as well as how to leave a mooring and return, meeting emergencies, etc.

SEAMANSHIP is doing the right thing quickly at the right time. Usually there is little time for careful thought and reasoning, thus making a seaman's actions more or less instinctive, based on repetition and thoroughly ingrained principles. Therefore, to handle a sailboat, one should understand how the action of the wind on the sail causes it to move

forward. For this purpose, the sail can be compared to an airplane wing. The force of the air striking the windward side of a sail is but a small fraction of the total force; like a wing, most of the force is developed by the leeward (away from the wind) side upper side in the case of a wing. This force may be considered to be exerted at right angles to the plane of the sail, in the direction a pin would project if thrust through a sheet of paper cut like a sail, Fig. 4. The centerboard of a dinghy, and the keel of keel-type boats, tend to resist the side pressure, with the result that the boat moves ahead, Fig. 3. Just as an airplane wing loses its lifting action when the angle of the wing with the wind becomes too great, so does a boat sail lose its driv-



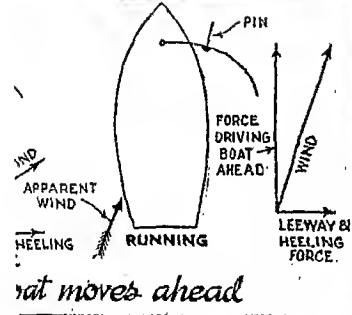
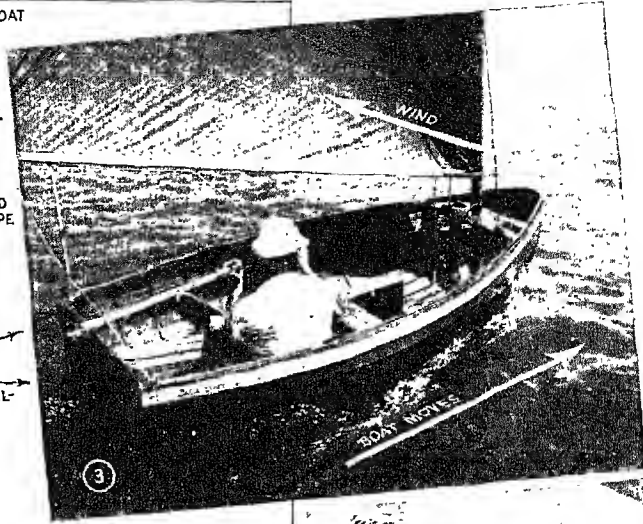
MAKE GOOD SEAMEN

EL OF BOAT

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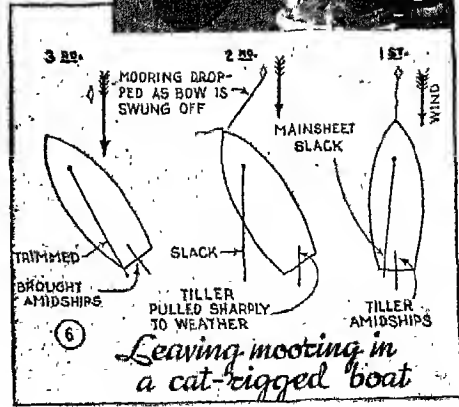
BOARD
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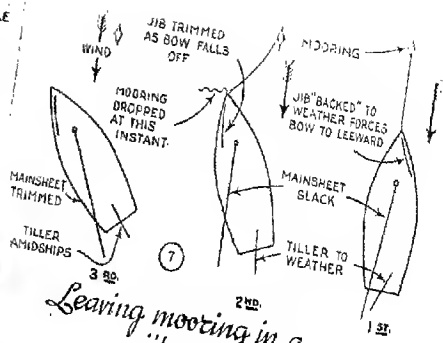
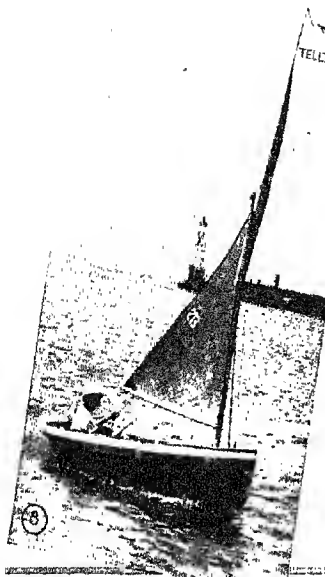


ing force when its angle becomes too great. A sail is then said to be trimmed too hard.

Getting the boat ready: As the cat-rigged dinghy is one of the most popular and rapidly growing classes of boats, we will use it in our sailing test. First, the mast must be stepped; that is, dropped through the hole in the forward thwart and into its step. Then the shrouds, one to a side, are set up as Fig. 2, with the lanyard running through an eye in the shroud to give added purchase. The shrouds should be equally taut so that the mast is not pulled in either direction. Then the rudder is stepped, Fig. 5, and a cotter pin is inserted to keep the rudder from jumping off in a seaway (motion of the waves). Next, the sail is hoisted, setting the luff just hand taut so that when the breeze fills it there will be no wrinkles. You can learn the various parts of a sail and boat by referring to Fig. 1. Now, the boat is launched and the centerboard is lowered.



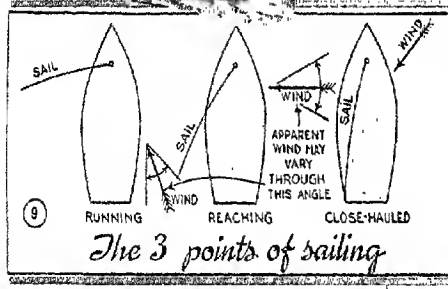
*Leaving mooring in
a cat-rigged boat*



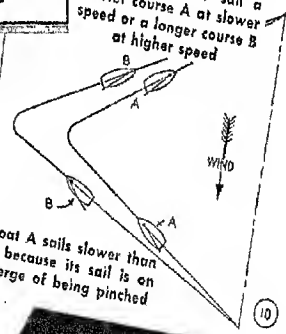
Leaving mooring in a jib-and-mainsail boat

from the wind). Hoist the sails with the mainsheet slack. Then unfasten the painter and trim the sail. If the boat is on the windward side of the dock, a smart shove will carry it clear as the sail is trimmed.

The "points" of sailing: There are three "points" of sailing: close-hauled, reaching and running, each referring to the direction of the wind in relation to that of the boat, Fig. 9. Close-hauled is difficult since

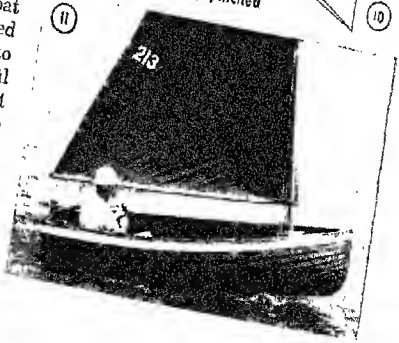


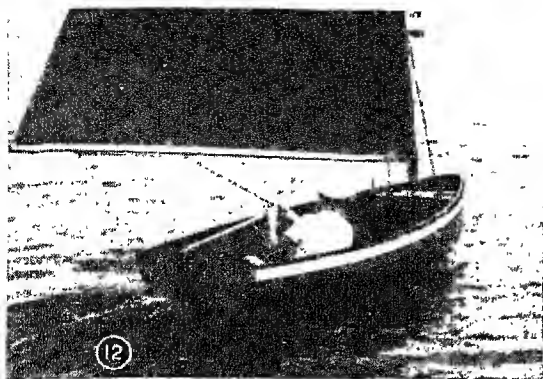
A good seaman must decide whether to sail a shorter course A at slower speed or a longer course B at higher speed



Leaving the mooring: As it is easier to take a boat away from a mooring than from a dock, this will be done first. When moored the boat lies head to the wind as in Fig. 6. A sharp pull on the tiller will swing the bow off in the desired direction, after which the sheet (a rope used to control a sail) is trimmed (taken in) until the sail is at the proper angle and the boat moves ahead. When it is on the desired course the tiller is brought amidships (to the center). With a boat having mainsail and jib, the procedure is different in that the pull of the jib can be used to turn the boat from head to wind, Fig. 7. The mainsheet must remain slack during this maneuver; otherwise the force of the mainsail will counteract that of the jib.

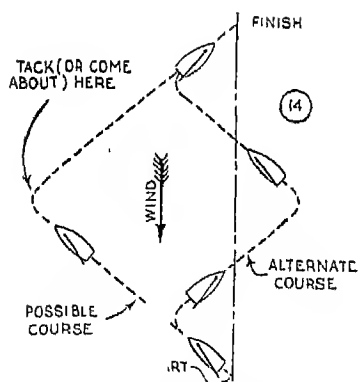
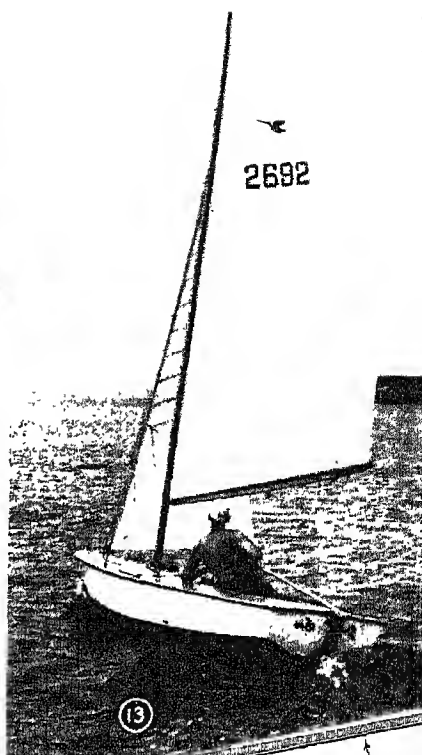
Leaving the dock: Leaving a dock is easy if the boat is to leeward (on the side away



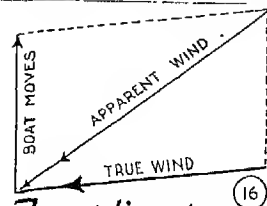
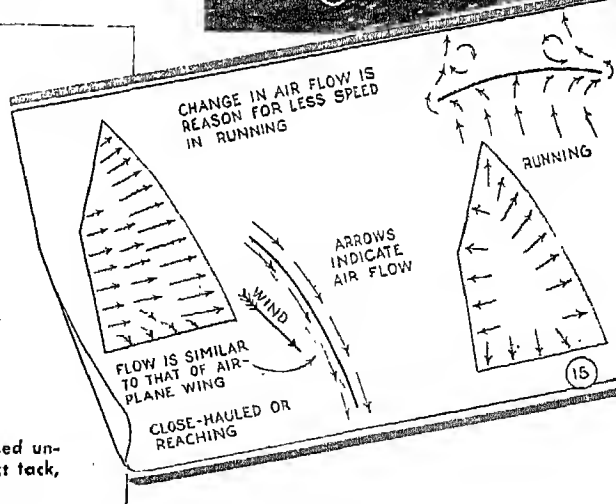


you must decide whether to point higher (closer to the wind) and travel a shorter course at a slower speed, or to sail a bit fuller (slightly farther from the wind) and travel a longer course at a faster speed, Fig. 10. This is important as it is by tacking, Fig. 14, that a boat sails to a point directly to windward. To sail a boat close-hauled, trim the mainsheet until the boom is over the leeward corner of the transom, Fig. 11, and ease the boat into the wind by moving the tiller slightly to leeward.

Use a telltale (wind direction indicator), so placed that it can be watched constantly. Several strips of colored silk ribbon, $\frac{1}{4}$ in. wide,

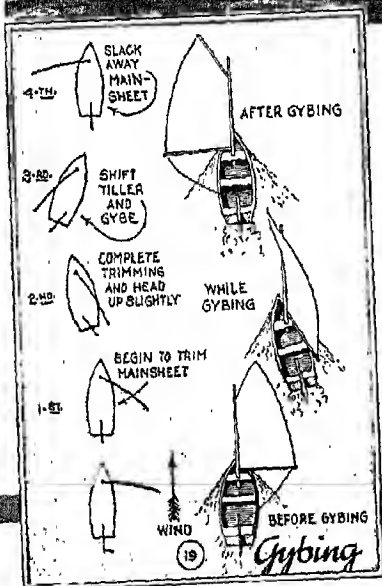
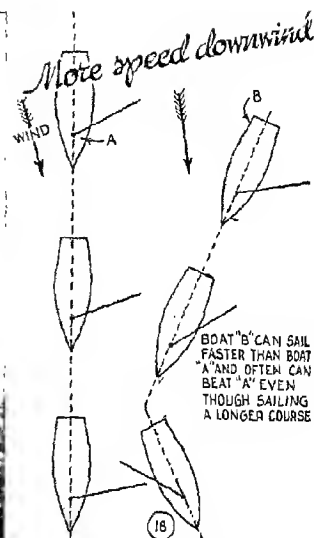
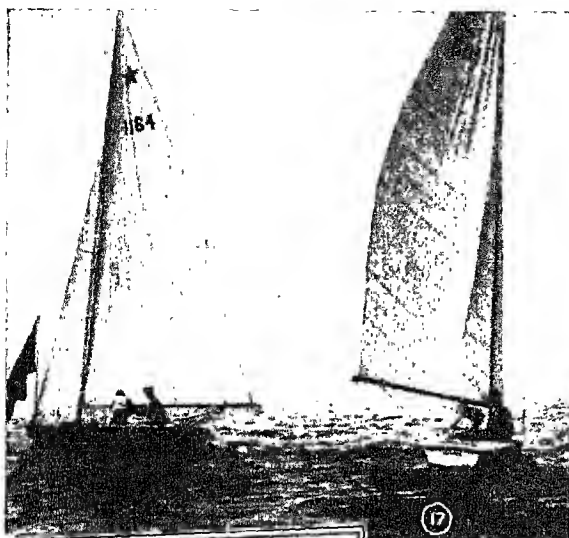


To work into the wind, sail close-hauled until finish point can be reached on next tack, or tack several times



*To estimate
apparent wind*

on a 2 or 3-ft. length of bamboo that can be fastened to the end of the gaff is excellent, Fig. 8. The telltale shows the apparent wind, which is the true wind as it is changed to the sailor by the boat's motion. A boat sails on the apparent wind—never on the true wind. In sailing close-hauled, keep the upper portion of the sail almost parallel with the telltale ribbons. The twisting of the sail is normal and helps drive the boat in light air when the wind close to the water's surface is retarded.

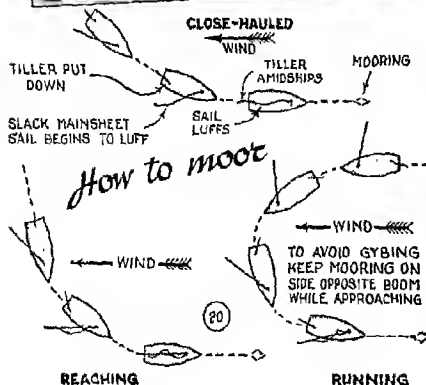


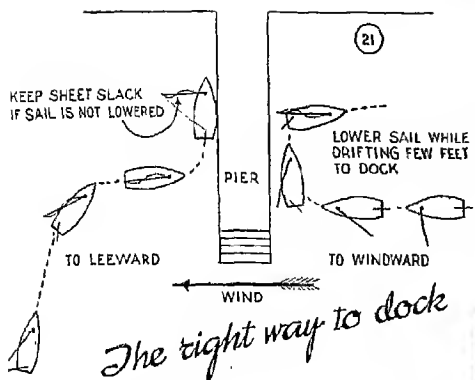
Reaching: In reaching, the boat sails more or less across the wind, Fig. 9. To change from sailing close-hauled to reaching, move the tiller up (toward the wind). Then as the boat's head falls off to leeward, slack the mainsheet. Fig. 12 shows how your dinghy looks now. Fig. 13 shows a Snipe class boat sailing on a reach.

Running: This is least exciting as the boat's speed is usually reduced and the apparent wind is much lighter. Fig. 16 shows how to estimate the apparent wind when the direction and the speed of the other is known, and the boat's speed can be estimated. To change from reaching to running, bring the tiller up slightly and pay out (slack away) the sheet. As you do this, the angle of heel is reduced, and the wind flows outward over all edges of the sail, Fig. 15. If the wind is very light, even small boats find it advantageous to tack downwind, Fig. 18.

While the maneuver called gybing (turning with the wind) is much used and is essential to sailing, an unexpected gybe can cause a lot of trouble. Guard against a sudden gybe by keeping close watch on the telltale; when the ribbons show that the wind is dead astern, bring the boat a few degrees into the wind. Gybing, Fig. 19, is more difficult than tacking as the mainsheet must be taken in very quickly, especially in stronger breezes, as the helm is put up. Fig. 17 shows two Star class boats; the left boat is about to gybe around a mark, while the right boat has just completed a gybe.

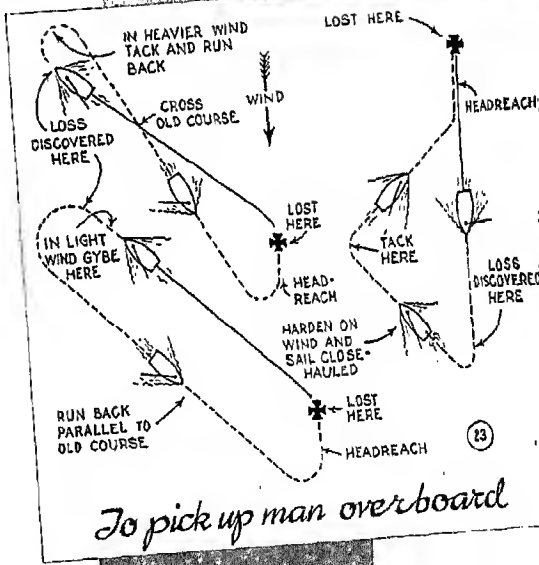
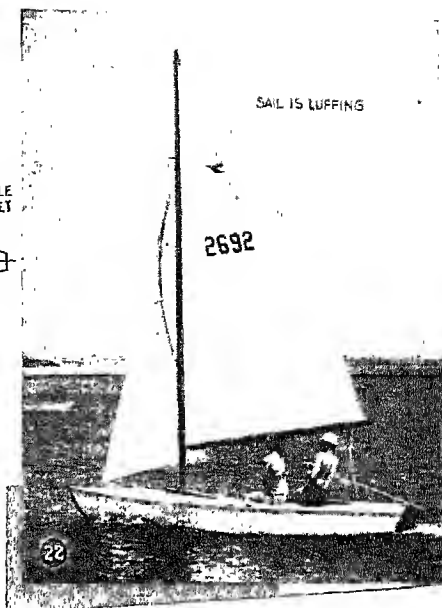
Mooring or docking: The methods of picking up a mooring from the three points





of sailing are shown in Fig. 20. Remember that the distance a boat will headreach (be carried forward into the wind) will vary with different conditions of speed and sea. When approaching a dock from leeward the task is simple. Merely headreach up to the dock, moor, and drop the sails. To land at the windward side of a dock, a small boat can be sailed directly downwind, Fig. 21, and then swung into the wind with a hard-over tiller. The hard-over rudder acts as a brake and the boat is almost dead in the water about a boat length away from the dock. By the time the sail has been lowered, the boat has drifted within reach.

Meeting emergencies: Three types of emergencies may be met in sailing a small boat. These are strong winds, hard squalls, and man overboard. Strong winds require a reefed (reduced in size) mainsail. On a small lake or bay where there is no possibility of being blown far from land, it is often wise to lower canvas on the approach of a squall that promises to be severe. In a jib-and-main-sail rig, the jib can be left standing. A small-keel boat or a centerboard boat with excellent stability can be luffed through a squall. This means that the mainsail is allowed to luff very markedly, as in Fig. 22. Practice picking up a man from the water by dropping overboard any object that will float, and then rounding back to it just as if you were coming up to a mooring, as in Fig. 23. Try to bring the object alongside



at the moment when speed is much reduced when it would be easy to assist a person. Nearly everyone that sails a boat sooner or later has occasion to assist a tired swimmer, and practice in all possible maneuvers is the only way to guarantee that it can be done quickly and correctly. When assisting a swimmer, it is a good idea to pass a line under his arms and support him in the water for a few minutes until he has rested sufficiently to assist himself before attempting to bring him aboard.

Boat Suggestions

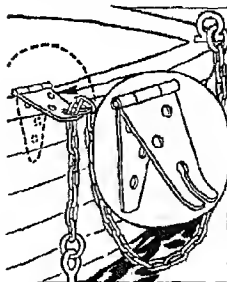


Old Tire Rim Sunk in Ground Provides Boat Anchorage



Partly buried in the bank of a lake or stream, an old auto tire rim provides a good anchorage for tying up your boat. The rim will last much longer than a wooden post or large stake, and the boat will not be used without your knowledge as the chain cannot be slipped off when it is wrapped once or twice around the rim and locked with a padlock.

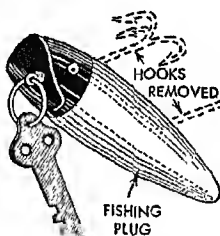
Holder Supports Anchor of Boat To Change Fishing Location



Instead of pulling the anchor into the boat every time he wants to move a short distance to a new location, one fisherman uses this simple holder to support the anchor a few inches off the lake bottom. The holder is merely a hinge screwed to the inside surface of the boat so that one half of it hangs over the side, the end of the hinge being slotted to take the anchor chain.

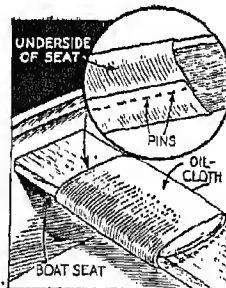
Floating Tag for Your Boat Key

Instead of throwing away an old fishing plug of the floating type, remove the hooks and use it as a tag for your boat key. Besides keeping the key afloat if accidentally dropped into the water, the bright colors on the plug will be helpful in locating the key if it should be dropped in tall grass or weeds.

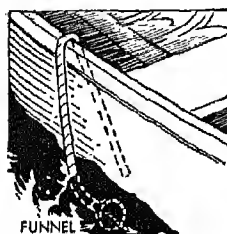


Endless Pad for Boat Seat Is Always Dry

To avoid the discomfort of a wet boat seat when returning to your boat after a shower, or after the splash of "landing a big one," wrap a grain sack around the seat. Then pin it to provide an endless pad, which may be pulled around to present a dry side when needed.

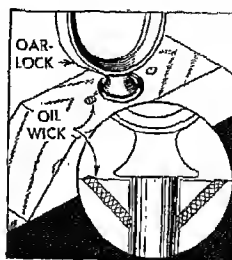


Seepage Water Drawn From Boat Through Suction Tube



A flexible or bent metal tube with a funnel slipped in the end can be used to draw seepage water from the bottom of a boat automatically. When the boat is in motion with one end of the tube touching the floorboards and the funnel end dragging through the water, suction pulls the water out.

Eliminating Squeak From Oarlock



After two holes have been drilled into the wooden base of an oarlock at an angle as shown in the circular detail, they can be used to lubricate the oarlock and eliminate the squeak caused by a dry condition. To obtain best results, insert wicks in the holes. Wicks should be kept lubricated.

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